



***“PUBLICLY FINANCED
EMERGENCY RESPONSE
AND PATIENT
TRANSPORT SYSTEMS
UNDER NRHM” –
Final Report :***



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**Publicly Financed Emergency Response and Patient Transport Systems Under
NRHM**

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ACRONYMS

ALS – Advanced Life Support	PIL – Public Interest Litigation
ANM – Auxiliary Nurse Midwife	POL – Petrol Oil and Lubricants
AP – Andhra Pradesh	RCH – Reproductive and Child Health
ASHA – Accredited Social Health Activist	RKS – Rogi Kalyan Samiti
AVLT – Advanced Vehicle Location and Tracking	RTA – Road Traffic Accident
AWW – Angan Wadi Worker	SBA – Skill Birth Attendant
AYUSH – Ayurved Unani Siddha and Homeopathy	SC – Schedule Cast
BLS – Basic Life Support	SOP – Standard Operating Procedure
BPL – Below Poverty Line	ST – Schedule Tribe
CAPEX – Capital Expenditure	ZHCL – Ziqitza Health Care Limited
CEO – Chief Executive Office	
CHC – Community Health Centre	
DFID – Department for International Development	
EMRI – Emergency Management Research Institute	
EMT – Emergency Medical Technician	
ERS – Emergency Response Service	
GDP – Gross Domestic Product	
GIS – Geographic Information System	
GoAP – Government of Andhra Pradesh	
GPS – Global Positioning System	
HIS – Institute of Health Systems	
HLEG – High Level Expert Group	
HR – Human Resource	
HSVS – Haryana Sasthya Vahan Sewa	
ICU – Intensive Care Unit	
IMR – Infant Mortality Rate	
IPD – Indoor Patient Department	
IT – Information Technology	
JE – Janani Express	
JSY – Janani Suraksha Yojana	
km – kilo meter	
MCH – Mother and Child Health	
MMR – Maternal Mortality Ratio	
MO – Medical Officer	
MOHFW – Ministry Of Health and Family Welfare	
MOU – Memorandum Of Understanding	
MP – Madhya Pradesh	
NCD – Non Communicable Diseases	
NHSRC – National Health Systems Resource Centre	
NRHM – National Rural Health Mission	
OPEX – Operational Expenditure	
PGI – Post Graduate Institute	
PHC – Primary Health Centre	

EXECUTIVE SUMMARY:

In the year 2005, when NRHM was launched, the nation had no functional model of either emergency response systems or assured transport for pregnant women in any state or region. There were a large number of hospital linked private ambulance services, which catered to limited populations in major cities. There were a few experiments with ambulance services outsourced to local non-government organizations in West Bengal and Tamil Nadu. Further organization of publicly financed referral transport systems was not a significant part of either the RCH-II project designs or a significant feature of the XI Five Year Plan. Nevertheless In 2012, as NRHM comes to an end we estimate that about 4500 publicly financed ambulances ply in 22 states linked to call centres, not counting the tie-ups with local private transport providers, and together they shift over 20,000 patients per day, and provide assured emergency rescue services for about 45,00,00,000 people- close to 38% of our population. Another six major states are at the point of starting up or going to scale, which would be a further addition of almost 3000 ambulances, which would offer coverage to nearly 60% of our population. It is also India's largest and perhaps most successful public private partnership in the health sector with a current annual spend of about Rs 540 crores and likely to increase to Rs. 900 crores in the current financial year.

There are many contributors to this success. Firstly, flexible financing and the public health environment under NRHM provided the space for states to innovate. The second driver of innovation was some truly "disruptive innovation" making use of the changed technological scenario, by what was essentially an Information Technology firm. Then political populism and electoral verdicts, corporate imagination and corporate sleaze, legal contestations in higher courts and inspired administrative stewardship, technological prowess and some down to earth academics, local innovation and naiveté local innocence all contributed in different and often contradictory ways to shaping the final outcomes- of what is indeed one of India's brilliant public health innovation in the last five years. Never was the idiom of India's progress as analogous to that of the "lumbering elephant" more appropriate. If we get it right in the 12th Plan period, we could achieve in ten years, what it took the industrial nations a century to achieve.

But for that, to happen we need to take a look at the different systems that have evolved on the ground, in the last five years, assess their strengths and weakness and plan imaginatively for the way forward.

The Three Business Models of Emergency Study Findings:

The dominant model of emergency response and patient transport systems is the Dial 108 model. In this model approximately one ambulance is positioned for every one lakh population, and each ambulance has a staff of three drivers and three paramedical emergency technicians, with two supervisors for every 15 vehicles. These vehicles are coordinated by a single state level call centre which can be reached by dialing 108, which is common for police, fire and health emergencies. The call centre takes the call on dispatching the vehicles. Service is cashless. Standards of care require the pick up within 20 minutes near urban areas and within 40 minutes in rural areas. The model provides for emergency care en-route.

Our study showed that in a sample of consecutive emergencies as coming into health care facilities about 43% use the dial 108 service. Of those who did not use it only 5.6% had called and failed to get the vehicle. Only 10 out of 212 reported failure due to a 108 being on another call (timed out). Non users are more frequently located near the facility where alternative transport is readily available, or further than 40 km. More vehicles deployed would reduce the latter but change the cost profiles. On an average 108 vehicles took 33 minutes to reach the pick-up point and 21 minutes to reach the nearest hospital- but this is taking both rural and urban together. In 13% of case the 108 service took around one hour to reach the emergency site.

On all equity parameters the 108 services do very well- a large proportion of their clientele are women, rural and below poverty line. No doubt the cashless nature of service helps. Over 76% of them were shifted to a public hospital and about 24% shifted to a private hospitals- though this could range from 10% to 40% in our sample. Obstetric causes account for 25% of usages, injuries including burns and trauma accounted for 18% and the rest were spread over other causes.

The service costs Rs 1.05 lakhs per vehicle per year or about Rs. 11 per capita- which is clearly affordable. Though the costs are higher than other models, this service also provides stabilization care through a trained technician with tele-back up, has a robust management policy for innovation and renewal, and pays its staff adequately- all advantages that only this model offers.

The Haryana Swasthya Vahan Sewa (HSVS) Model was a conscious effort to promote more affordable care within a specific context of health systems development, by a) managing it within the government department b) utilizing all standing vehicles of the department- with some incremental additions and c) focusing on pregnant women and emergency obstetric needs- given the level of facility development. Our study shows the HSVS achieves its limited objectives with reasonable effectiveness, though there is a problem with timeliness. It is on the whole less expensive – there are lower “additional costs “ of providing the service, and lower costs per district- but since this is for a lesser range of services, it is not necessarily more efficient. And the range of services provided is too limited- and though justified by past context, cannot be a prescription for scaling up. However we note that these assets that HSVS uses so effectively are also available in states where dial 108 is the only mode- and in effect HSVS should alert us to the immense possibility of using these assets by putting in place a call centre, monitoring systems and a management system. If the HSVS approach is synergized with 108 services, much of the load of inter-facility transfers, drop back to homes and other forms of elective patient transfer- including many pregnancy transfers can be taken on by such a system, leaving the 108 services to provide emergency rescue services requiring stabilization care- which is what it is better meant for. Utilizing Dial 108 for inter-facility transfers and drop back to homes would be an inefficient use of resources.

The Janani Express (JE) Model- examined in its best case scenario of Nabrangpur district is a purely local arrangement done entirely by skillful use of various existing budget heads and innovative micro-management of details. It shows how decentralized facility level tie-ups with local providers can bring about assured patient transport services in very remote, dispersed and conflict-ridden areas. The model also expanded patient transport provision paripassu with facility strengthening for institutional delivery and emergency obstetrics. Among all systems studied this showed the highest percentage of pregnant

women transfers for delivery- and no doubt its cultural acceptability, and lack of alternative transport had much to do with this. Though the national health systems context has changed too far to talk of scaling this up, we still think that this approach has a relevance as an add-on to a basically dial 108 model. Noting from our study on the 108 services, that as areas become more remote, there is a need to either opt for a greater ambulance density which would sharply increase costs without commensurate increase in benefits, or settle for areas of very poor coverage- we make a case for linking JE type arrangements in the difficult periphery with a more centrally managed dial 108- and linking these through the same call centre. This again is a form of differentiating between ambulance needs and patient transport needs. Further we note that in tribal areas, sick patient transport needs from village to primary and secondary care facilities have their own urgency, even in non-emergency situations. A suspected falciparum malaria, whose fever is not settling is not an emergency, but is certainly a case for essential patient transport. Our contention is that the costs of the JE approach are so affordable that in many social and geographic contexts this would be an essential add-on to what a core service provided by the “Dial 108” model.

The main challenge before the health system is the integration of the rapidly expanded 108 services with a planned and accelerated pace of development of facility based emergency care services. The other areas for improvements in what could be called independent monitoring, including tweaking of standard operating procedures, so as to be better able to defend the system and support its expansion. And finally the most challenging of all is to ensure that government policy keeps at least three to five good quality capable service providers in play through imaginatively “managed competition.” Though GVK-EMRI and now Ziqitza Health care Limited (ZHL) have shown remarkable technological and administrative innovation, the direction of further growth and innovation and the sustainability of the programme requires a proactive role for both state and central governments.

THE WAY FORWARD:

1. Emergency response system must be seen as a chain- -immediate pre-hospital care, retrieval and transport, en route stabilisation care and emergency care at the facility and subsequent follow up. These should be part of an integrated district plan to develop a network of assured service delivery facilities for each type of emergency care: Obstetrics, trauma care, burns, poisoning, cardiovascular, other medical emergencies, surgical emergencies and ophthalmic emergencies. Facilities providing assured services and ambulances providing emergency rescue services should be linked and improved in a step wise fashion leading to achievement of universal access to assured services of RCH and to all emergency medical care and trauma care in the 12th Plan period.
2. A clear distinction should be made between emergency rescue and patient transport services. The Basic Life Support (BLS) “scoop and run” ambulance, would have a 6 week trained paramedic on board, and would manage splints and even blood transfusion if need be, plus active intravenous drugs and electrolytes under tele-guidance. In Patient transport there is no golden hour applicable – and no requirement for active stabilisation care is needed en route. Deliveries could be part of patient transport systems or of part of BLS arrangements. A single call centre should link both types. Most states are not in a position to utilise Advanced Life Support (ALS) ambulances which can provide emergency cardiac care including ventricular defibrillation and the introduction of these

could be deferred till we afford multiple levels of ambulances stationed together and also adequate dispersion of intensive cardiac care units.

3. By integrating government owned ambulances as has been done in the HSVS model and local patient transport tie-ups as in the JE model, with the dial 108 model- we could at very affordable costs get a much larger range of patient transport services going, without adversely affecting emergency rescue services.
4. In addition to the “Dial 108”, government ambulances and local partnerships all running as one coordinated system in a district, there could be one more level of voluntary vehicles available on call- one for each village. All of these could get mobilised together in a disaster situation. In other times, it would provide some duplication cover, in case the first vehicle is timed-out (engaged on another call). In many international systems, a second ambulance would be on wait, but this may be more affordable for us, especially if the main load is patient transport and not true emergency rescue. This is also useful for more dispersed areas.
5. Deputing and incentivising a trained ANM or staff nurse or ASHA in the van, for pregnancy despatches, where travel times are high or labour is advanced, would help provide better care for on-the-way deliveries and deliveries taking place at the pickup point. This is most needed for tribal areas and dispersed populations where turnaround time is very high.
6. Properly tendered and organised and fine tuned, the net costs of the ambulance and patient transport services in a district should not be higher than Rs 20 per capita per year (or Rs 2400 crores nationally) at current rates of utilisation – after optimisation for quality and building synergy across all patient transport systems. This cost could be shared between state and centre. Even with much better utilisation, and service quality and range of patient transport services it is unlikely to exceed Rs 7200 crores which between centre and states is quite affordable. The centre should retain 50% of both Capital expenditure (CAPEX) and Operational expenditure (OPEX) costs at all times.
7. “Managed Competition” between a limited number of management agencies having the capacity to run the ambulance services is the best way to ensure rapid expansion in coverage, improved quality of care and continuous innovations, while ensuring a sustainable rate of returns. MOHFW must play a role in promoting cross learning across states, in the development of model procurement and management processes, and such pro-active policy initiatives as are essential to keep at least a few such agencies in play. The challenge is also to avoid the problems of unfair restriction of services in a capitation fee model versus unwarranted increases in service provision in a fee-for-service model. (Some broad guidelines on the tendering process and the financing model are recommended in the main text). To play this role it must be assisted by a good observatory and technical support function. Given the limited opportunities firms have for profit maximisation in this model, government role in finding and retaining a minimum number of responsible and capable ambulance services providers/management agencies and ensuring that they are getting a sustainable level of returns, should not be under-estimated. As part of being able to manage competition it would be useful to strengthen government managed ERS in two or three states- but for this a board has to be

constituted and given sufficient powers, and the board has to set internal rules and HR norms sufficient for the purpose.

8. States need to provide a legal framework needed for putting in place emergency medical care as a basic right. The act should also ensure private sector engagement, public sector prioritisation, human resource development, and the institutional reforms needed for achieving this goal.
9. There is considerable room for point of care innovations with telemedicine, for better on the way stabilisation, and for better human resource development and in financing and governance. A systematic transfer of technology from the best of international practices to Indian providers and support teams should be supported through public financing.
10. We suggest a national workshop with participation of all key stakeholders, to share these findings and those from other studies, finalise the standards, programme design and strategy to take it forward.

In conclusion:

Much water has flowed down the bridge, since the time when NHSRC last reviewed the progress of Emergency Response Systems. Costs have come down, the programme has expanded, the efficiency has increased, alternative models have provided new insights, the number of service providers has increased and the ability of facilities to respond to the emergencies has also increased. Perceptions have changed in both the state and the centre, to seeing such investment as both affordable and essential. State ownership over the scheme is also no longer a constraint.

Though initiated sporadically by a few states making use of the NRHM provided flexibilities for innovation, and driven forward in the 11th Plan period by the need to ensure universal access to institutional delivery and emergency obstetric care services, publicly financed emergency system has gone far beyond that. Instead of almost inadvertently and reluctantly being dragged into the world of publicly financed emergency medical care, the MOHFW needs to proactively embrace it. The national commitments to provide emergency medical care have been made clear in both the public announcements of the prime minister, and the working group reports on the 12th Plan. Court rulings on access to emergency medical care provide a legal mandate. The HLEG report of the Planning Commission has given a call for the political will to raise public health funding to 2.5% of the GDP to and achieve universal health care. All these circumstances make it an opportune time to design a centre-state joint implementation framework, with costs shared between the two, for reaching this goal of universal access to emergency medical and trauma care.

PUBLICLY FINANCED EMERGENCY RESPONSE AND PATIENT TRANSPORT SYSTEMS UNDER NRHM

BACKGROUND:

In the year 2005, when NRHM was launched, the nation had no functional model of either emergency response systems or assured transport for pregnant women in any state or region. There were a large number of hospital linked private ambulance services which catered to limited populations in major cities. There were a few experiments with ambulance services outsourced to local non government organizations in West Bengal and Tamil Nadu. Further, it was not even on the agenda. Organization of publicly financed referral transport systems was not a significant part of either the NRHM or the RCH-II project designs. It was not a significant feature of the XI Five Year Plan. Nevertheless In 2012, as NRHM comes to an end almost 22 states have one or other of these services, all of which are highly visible and reasonably functional. In short we estimate that there are over an estimated 4500 publicly financed ambulances ply in these 22 states linked to call centres, not counting the tie-ups with local facilities, and together they rescue or shift over 20,000 patients per day. Another 6 major states are at the point of starting up or going to scale which would be a further addition of almost 3000 ambulances.

There are many contributors to this success. Firstly, flexible financing and the public health environment under NRHM provided the space for states to innovate. The second driver of innovation was no doubt the creative search for business models of providing public services that was led by Mr. Ramalinga Raju of Satyam Computers. This was only one amongst a number of such innovations launched then. Then political populism and electoral verdicts, corporate imagination and corporate sleaze, High Court and Supreme Court interventions, technological prowess and some down to earth academics, local innovation and local innocence, and administrative interventions sometimes restrained and thoughtful and sometime bashful and loud, all contributed in different and often contradictory ways to shaping the final outcomes- of what is indeed one of India's most brilliant public health advances in the last five years. Never was the idiom of India's progress as analogous to that of the "lumbering elephant" more appropriate. If we get it right in the 12th Plan period (and never mind the actual text of the 12th Plan) we could achieve in ten years, what it took the industrial nations a century to achieve.

But for that, to happen we need to take a look at the different systems that have evolved on the ground, in the last five years, assess their strengths and weakness and plan imaginatively for the way forward.

EVOLVING PROGRAMME DESIGNS AND PROGRAMME THEORIES

The problem of lack of an efficient ambulance service is an old one. One answer to the problem was to provide every district, block hospital and in some states PHCs also with an ambulance and driver. These would occasionally get used for inter-facility transfer of patients, but were almost never used as emergency response or rescue – whether from the house or from an accident site. They were however

used for transport of commodities and personnel- even sometimes for personal use, especially as part of a VIP convoys.

When RCH-II was being designed- one of the constraints to provision of emergency obstetric care and safe delivery which had been noted – was the lack of an assured referral transport system. Under RCH the main approach had been to make a sum of Rs 500 available through Panchayats for the woman in labor to be able to hire transport to reach the hospital. The experience with this was very unsatisfactory but largely attributed to its mode of delivery. It was hence re-packaged into the Janani Suraksha Yojana as a demand side financing to meet transport costs that would enable women to reach the institution. There is considerable reason to believe that this was effective, for the number of institutional deliveries rose very much, with the use of local vehicles to reach the hospital for delivery. In Tamil Nadu and West Bengal there was already in place a set of tie-ups with local NGOs either having their own vehicle or being provided a government ambulance to manage these services. Where these were used, the Rs 250 in the JSY package could be either used by beneficiary to reimburse the ambulance service provider or was directly transferred to the ambulance. This was the first model to pick up with Bihar entering into such tie-ups for all patients reaching the hospitals, but with user fees for all- irrespective of BPL status. Madhya Pradesh and then Odisha expanded on this calling it the Janani Express model. In Madhya Pradesh there was a district level call number, supplemented by sharing of mobile numbers between the potential beneficiaries, the ASHAs and the peripheral transport service provider and facility service provider. In Odisha only the latter was put into place. Studying Madhya Pradesh JE in its early years, the NHSRC found it to have varying implementation and changing rules and the study remained uncertain of its outcomes and the adequacy of its processes.

In parallel to these developments, Andhra Pradesh started experimenting with a public private partnership with Satyam – a IT corporate, to establish and manage an emergency response ambulance services on the lines of the 911 services of the United States. EMRI (Emergency Management and Research Institute) began operations in Andhra Pradesh (AP) on April 2, 2005 with a fleet of 30 ambulances across 50 towns of the state. The initial impetus was to build a business model and if possible a monopoly of providing a nationwide ambulance service, which could be self-financed. As user fee based services seemed difficult to establish, and government was willing public finance was sought. Initially the government was paying only the running costs. In 2006 and then again in 2007 it was scaled up to 400 ambulances with a contract where 95% of both capital and running costs were paid by the government and in effect Satyam provided the management and the software applications. This was when private provisioning and public financing was emerging as a desirable. In 2006, the NRHM was in place and it provided finances for state initiatives and therefore could fund, what was essentially a state innovation. One of the main justifications for NRHM support was that it was fulfilling the role of assured transport for pregnant women in a more effective manner than other alternatives.

In 2008, the EMRI had expanded the model to over 3 states and in 2009 to over 9 states. It was immensely popular, but there were concerns with costs and outcomes which led the NRHM to ask NHSRC to review the programme. Even as the study was underway, the collapse under charges of fraud of Satyam brought the whole EMRI model under much more hostile scrutiny. Though eventually the EMRI was never blamed for any financial irregularities, it gave added urgency to the NHSRC study.

The NHSRC study upheld the model as a significant achievement and step forward in the provision of emergency services in the country. The EMRI had been designed with state-of the art hardware and software technology, infrastructure and management structures and adequately manned and supported and with a very high quality of professional management which had repeatedly improved its effectiveness. However the report also cautioned that it needed a sounder financing policy, rather than a “whatever it takes” approach which could lead to runaway costs- and better governance since it was almost completely publicly financed. Also it cautioned against a provider monopoly. Finally it pointed out that a disproportionate attention to rescue without sufficient attention to the rest of the emergency management provision would be counter-productive. The study noted that on issues like equity of access, coverage and adequacy and prioritization of care, and independent confirmation of claims on timeliness, and quality of care, a second phase study would be needed.

An immediate flurry of developments followed in the period immediately after this study was released.

First- the Government of India issued a guideline where it committed to bearing all the capital costs and 60% of the operating costs in the first year- and then reduce every year to 40% and 20% of the operating costs in the next two years- after which it had to be supported with state funds. This brought much greater state ownership and with it much greater concern on the nature of financing.

Second with the consent and encouragement of state and central government, the ownership- leadership in the board was taken over by another real-estate corporate group –GVK.

Thirdly, subsequent allocations of Emergency referral transport services to EMRI were challenged in court, which quoting the NHSRC study required a transparent tendering process to be followed and more safeguards put in place. Subsequent to this at least eight states floated tenders for this service and in four of these Ziqitza won the tender (Rajasthan, Punjab, Kerala- one district pilot and Odisha), and in three it went to court of which in one, Himachal the service was awarded to GVK-EMRI. In Jammu and Kashmir and UP it was awarded to EMRI and in Bihar it was awarded to a third party, but the latter two have been challenged in court, Maharashtra has also tendered but now yet announced the results.

The fourth development, was that in response to the questions hanging over the cost-benefits ratio of EMRI, the questions over prioritizing rescue over facility development and the whole question of outsourcing as the solution Haryana came up with a different business model- where pregnancy referral transport was the priority, and other emergency rescue secondary, call centres were located at the district level and its was completely internally managed by the government. Though there were problems with it- it brought into public gaze a different approach to achieving the similar ends- a only public sector based approach.

One caution needs to be made that the mobile medical unit is an altogether different animal- and need not be confused with any of the three above ERS models- what we call the JE model, the ERS model or the HVS Model- Health Transport Service Model. It could be argued that even these three models do not have the same objectives. However we reasoned that all three of them are to varying degrees providing both assured referral transport for the pregnant woman as its single biggest “business” and though proportions of other forms of patient transport varies, it is worth comparing them- to learn from

all three about strengths and weaknesses- so as to help administrators reflect on the programme design and improve upon these.

Today the government spends over Rs 400 crores per year on publicly financed emergency transport systems- and even if central share goes down the net spend in the current year is likely to be more like Rs. 600 crores. It has till date spent at least 2400 crores on these schemes. The scaling up and universalisation of access to emergency transport systems is going to happen- it is part of the public commitment made by the prime minister, it is part of the working group report on NRHM submitted by the ministry and it will be an important part of the 12th Five Year Plan. This study was designed to learn from the diverse experiences on the ground to do better in future.

OBJECTIVES:

1. To describe the three main models of emergency response ambulance services and assured referral transport mechanisms that have evolved under NRHM
2. To compare the different business models –or approach to the provision of assured referral transport and emergency response ambulance services – that public finance has supported- for their strengths and weaknesses in terms of:
 - a) Coverage, timeliness, prioritization and quality of emergency response,
 - b) Provision of an assured cashless transport service for pregnant women and sick newborn.
 - c) Costs and sustainability of the models
 - d) Equity of access to these services
 - e) Outcomes- with respect to the rest of the emergency health care chain.
3. Drawing upon these studies to make recommendation to the future design of ERS and the principles of design that could be used to improve the efficiency and effectiveness of each and adapt each of these business models to different contexts

METHODS:

It was decided to commission three studies, to study each of the three main business models where they are most mature in terms of design, number of years of running and efficiency and continuity as well as efficiency of management.

The state ERS model; of which both EMRI and Ziqitza provided services are examples, was studied at its most mature site- Andhra Pradesh. In Andhra we chose to study it in three districts, each from one of the three different regions- coastal Andhra, Rayalaseema, and Telengana regions. The tools were developed by NHSRC in discussion with Institute of health Systems Hyderabad, who did the data

collection, analysis and presented a state report. In addition NHSRC did a qualitative study and secondary data collection in these three districts.

For a district model with assured referral transport for pregnancy as primary focus, and emergency response as secondary, we studied the HSVS model- the more mature and established amongst the two states- which have opted for this approach. The other state is Jharkhand the Mamta Vahan Sewa, and Matahari express in Chhattisgarh. The tools for the study and the qualitative parts were developed jointly, and the quantitative study was carried out by School of Public Health PGI Chandigarh who also developed and did a detailed cost analysis of the scheme. The state report has also been published as a standalone report.

In both the above studies – in the quantitative part , our focus was on taking a sample of patients admitted as emergencies or as pregnant women in labor through the ERS and others who reached the hospital through other means to compare their experiences. The latter group helped us find how many non users had tried to use the assured referral system and failed, and the other reasons for non-use or preference to other modes of transport. In the qualitative part the study looked at the secondary data from the service providers, plus had interviews with key respondents – programme managers, and some of the users and non users of the service representative of different shades of experience with the system.

For a Local Partnerships based model of assured referral transport , we decided to study the programme in Nabrangpur, where the model had matured and developed to its best through a considerable brilliance in local innovation and adaptation with a continuity of local leadership. That is the best case and most mature scenario to study is a call made by NHSRC based on its consultants extensive monitoring of the 260 high focus districts of the country, plus interesting findings that were quite incidentally noticed in its JSY study, where this had been a sample.

None of the samples are meant to be representative – they are purposively chosen to see the best potential of the model under different contexts and circumstances.

Each of these three studies are taken as separate case studies which in this paper we compare the three. The paper is broadly divided into four parts; part I is introduction to these three different business models of ERS and their description. Part II describes the performances of each model against the following parameters - reach, timeliness, costs, equity in access, Part III is a discussion on costs, financing mechanisms and governance and finally in part IV comparative strengths and limitations and possibilities of each model are assessed, the conclusions are stated as are the recommendations for the way forward.

FINDINGS:

PART – I: DESCRIPTION OF THE BUSINESS MODELS.

The “Dial 108” Business Model

The most widespread Emergency Response Model in India is the ‘Dial 108’ Emergency service. All states which have this business model, have outsourced it to management agency- and in 11 states the current agency providing the services are GVK-EMRI (Emergency Management and Research Institute), with four more in the pipeline, while another agency ZHL manages it in four states with one more in the pipeline (See table 1). A total of 3120 ambulances shifting approximately 12,000 patients per day.⁶The five more states that are due to start up are: Uttar Pradesh, where a 950 ambulance programme is committed and scheduled to start. Elections (and perhaps some legal issues) delay the programme start up. Jammu and Kashmir, Daman and Diu and Dadra and Nagar Haveli have also made agreements with EMRI for ERS service provision and Odisha with ZHL are also likely to start up.

The 108 call number is responsible for handling calls related to medical, police or fire emergencies. The “108 Ambulance Service” is a Public Private Partnership model between state governments and a private ambulance service management agency. The service assures complete pre-hospital emergency care from point of pick-up to evacuation and reaching an appropriate hospital. The standards for “108 Ambulance” are to reach patients/sites within 20 minutes in urban areas and 40 minutes in rural areas and to shift the patient to the nearest hospital within 20 minutes after reaching him/her.

Box 1: Salient Features of “Dial 108” Business Model

1. *One call centre located at state capital- with a single number 108. Call centre takes decision on sending vehicle.*
2. *Call service common to Police, Fire and Health Emergencies- 911 model- depending on the nature of emergency call is routed to the respective department.*
3. *One ambulance per one lakh population- with three drivers and three paramedics per vehicle and two supervisors for every 15 vehicles and two district managers.*
4. *A special cadre of paramedics with six weeks training on the van. The training has an institutional, hospital and ambulance component, certified by external faculty, syllabus: national workshop consensus. In practice many states have abridged the training programme into shorter levels.*
5. *Paramedics on van backed by telephonic advice from the doctor at the centre*
6. *Service is cashless- free – to all.*
7. *Inter-facility transfer not advised(see text at end).*
8. *Patient given limited choice of facility to go to. But the facility has to be within the zone. .*
9. *Financing: Reimbursement- single quote basis - increasing shift to tendering.*

⁶ Source of information – EMRI Hyderabad

The emergency transportation is conducted in a state-of-the-art ambulance, and the service is provided free. The ambulances have been designed with a uniquely Indian perspective and it includes space for the patient, paramedic in the back and also bench seat for family members.

The transportation is coordinated by a state-of-art emergency call response centre, which is operational 24-hours a day, 7-days a week. The call to the number 108 is a toll free service accessible from landline or mobile.

EMRI ambulance fleet includes both Basic Life Support ambulances (BLS) and Advanced Life Support Ambulances (ALS). The ALS ambulances are available with cardiac monitor and defibrillator in addition to the basic provisions of a BLS ambulance. The Emergency Response System (ERS) implemented by EMRI also includes trained human resources at the call centre staff to support staff in ambulances. There is a paramedical in each ambulance who is a graduate trained for three weeks with a special emergency medical care technician training programme.

Each ambulance has three pilots (drivers) and three paramedical EMTs who work in pairs on a 12 hour shift with a break every fourth day. For every 15 ambulances there is one operation executive supervising patient care and the paramedics, and one fleet executive managing the vehicle care and the driver. Above this pair, is one district manager and one administrative officer, for every district.

The ambulance agency recruits private hospitals who would participate in the ERS and this would imply cashless service for the first 24-hours till the patient is stabilized. For this purpose in Andhra Pradesh, EMRI has signed MOUs with large number of hospitals to formalise an understanding, that the hospital would not refuse admission if a patient is brought to it.

Service to all categories of patients is cashless with the government undertaking to reimburse the full costs of the provider. Earlier the amount of payment depended only on the bill raised by the company. Post 2009 at the onset of tendering there is a per trip rate that is fixed.

The government vehicles are redundant in the scheme. Their costs are neither worked in nor accounted for. In practice they are used for inter-facility transfers in some states- but not in most. The model does not recommend it- as such distances are larger and this leads to the ambulance being “timed-out”- that is unavailable for emergency response for long periods of time. However some states have insisted on this as they prefer all patient transport tasks to be under a single command. (In Andhra Pradesh, the GVK-EMRI MOU specifies that the Government of Andhra Pradesh would provide the list of hospitals district wise for inter-facility transfer and ensure proper referral slop from the lower level hospital to a higher government hospital. In all cases the higher hospital is a government hospital unless a government tertiary care hospital makes a transfer to a private tertiary care hospital. The GoAP, has to facilitate pr-arrival information from the ambulances to the receiving hospitals.)

Table 1: Overview of distribution of “Dial 108” Ambulances across India

States	Ambulances	Vehicles Per lakh population	Provider
States where “Dial 108” is functional			
Andhra	752	0.89	EMRI
Gujarat	506	0.84	EMRI
Uttarakhand	115	1.14	EMRI
Karnataka	517	0.85	EMRI
Tamilnadu	449	0.62	EMRI
Assam	280 + 1 boat	1.62	EMRI
Himachal	112	1.63	EMRI
Goa	24	1.65	EMRI
Meghalaya	42	1.42	EMRI
Chattisgarh	172	0.67	EMRI
Madhya Pradesh	99	0.14	EMRI
Rajasthan	465	0.68	ZHCL
Punjab	230	0.83	ZHCL
Kerala *	50 (1 dt.)		ZHCL
Bihar *	47(urban areas)		ZHCL
TOTAL	3869		
States where MoU signed- or tendering process completed			
Uttar Pradesh	950	0.48	EMRI
Daman and Diu	20	8.23	EMRI
Dadra and Nagar Haveli	20	5.83	EMRI
Jammu and Kashmir	50	0.40	EMRI
Odisha	280	0.67	ZHL
Expansion in Bihar	504	0.49	Jain Video on Wheels
Maharashtra	937	0.83	BVG Group
Expansion in Kerala [#]	250	0.75	ZHL
GRAND TOTAL	6867		

*In both states, it is expanding to whole state; # MoU not yet signed

The “Haryana SwasthyaVahanSewa” Business Model:

The Government of Haryana has launched a service branded as “Haryana Swasthya Vahan Sewa No.102” on 14th November 2009 with the main objective of providing assured referral transport for pregnant women in labour or newborns, as well as attending to other emergencies. All the 21 districts of Haryana are covered under the scheme.

The scheme offers (a) Transportation from the site of accident or home or any other place to nearest appropriate Medical Facility in case of medical need, and (b) Transportation from a Medical Facility to a higher medical facility. Free transportation Services are provided to pregnant women, victims of road side accident, patients belonging to BPL or notified slums, post natal cases in case of emergency (till 6 weeks after delivery), neonates in case of emergency (till 14 days after birth), freedom fighters and ex-defence personnel. For all other categories of patients, user-fees are charged which amounts to Rs 7/per kilometre.

The scheme is run by the government in collaboration with District Red Cross Societies and toll free telephone number “102” installed at each district control room for easy access to the public. There exists a 24x7 Control Room in each district hospital, for receiving the calls and monitoring of ambulances through GIS/GPS. There is common pooling of ambulances belonging to the Health Department as well as those owned or operated by the District Red Cross Societies. The operating cost for ambulances run by District Red Cross Society is reimbursed to them by the government. Nominally therefore it is a PPP also- though given the ownership pattern of the Red Cross society and the actual management practices- it is for all intents and purposes fully government managed.

Box 2: Salient Features of HSVS Model

- Call centre at district headquarters – (hospital)- common number 102.
- Focus on pregnant women and newborn transport. But available for other emergencies also
- One ambulance per block. Two drivers per ambulance. No paramedical.
- Free for all categories of pregnant women and newborn– irrespective of BPL status. For other uses cashless for BPL and User fees for the rest.
- Financing: Supply side- state ownership. Based on actual use.
- Selection Process: Not relevant- no private vehicles.
- Monitoring: Self; A state level cell

Table 2: Overview of ERS/ Referral Transport managed by state Governments

States	Number of Ambulance	Ambulance per lakh population
Haryana	335	1.32
Delhi	41	0.24

The Janani Express Business Model

The *Janani Express* scheme launched by the Department of Health and Family Welfare, Government of Madhya Pradesh (MP), on August 15, 2006 as a cost-effective referral transport innovation aimed at addressing the “second delay” contributing to MMR and the IMR. The understanding behind it was that MP was a very large and dispersed state with many tribal areas and poor road connectivity and it could not afford or succeed with a state wide EMRI model. It had started off with the latter, but later limited it to some of the major cities.

On similar lines The Janani Express Scheme was started in Odisha. In Nabrangpur district of Odisha, it started with the first vehicle in District Hospital in 2008. In 2009 ten more vehicles were introduced in all the Block PHC/CHCs (on a pilot basis), Today the scheme has been scaled up to the entire state of Odisha with 343 vehicles. Vehicles are attached to the concerned Health facilities and the medical officer in charge on a 24*7 basis.

The *Janani Express* scheme is also a Public – Private partnership model, where the contract is signed between the Government (at the district/block level) and the private vehicle provider who is generally a local transporter. The *Janani Express* is basically a vehicle hired locally by the RKS for a period of one year, to ensure provisioning of 24-hours transport availability at the field level (Block level) in order to bring the pregnant women to the health institutions. Transport is made available in the area served by a government hospital, CHC, and PHC. The Rogi Kalyan Samitis (RKS) of the concerned health facility plays the role of contractor including the task of monitoring and making payments.

The private partner is chosen by releasing an open tender as per the guidelines and accordingly the transport agency is selected. In the tendering process, specific requirements of the vehicle are specified and the bids are screened for technical merit. Usually vehicles more adapted and familiar with the terrain are selected– (jeep/Tata Sumo/Mahindra). Only after technical scrutiny and qualification is the financial bid considered. Since each RKS hires for its area, it could get different monthly rents across the

Box 3: Salient Features of Janani Express Model

1. *No call centre- sharing of mobile numbers between ASHAs, ANMs, AWWs, potential users, community and the facility- in-charge.*
2. *Focus on transfer of pregnancy and newborns. Gets used in other emergencies as local adjustment.*
3. *Ambulances stationed at block PHCs/CHCs- one per block plus additional one or two more in second or third PHC per block as needed.*
4. *One driver per ambulance.*
5. *Ambulances are local vehicles privately owned- contracted in on a full time basis with a fixed monthly rent plus extra payment per km travelled when in use.*
6. *Cashless- free services to all users.*
7. *Financing Mechanism: JSY transport amount of Rs 250 for each transfer deposited into RKS and used to pay POL. Monthly rent from RKS united funds.*

district. There are guidelines and models issued for the tender and for the contract. The contract terms ensure quality of service.

The term Ambulance has purposely not been used and the term *Janani Express* has been coined for the vehicle so as to avoid people confusing it for an ambulance; as it does not have all the facilities a typical ambulance is ought to have. The primary aim is to provide a means for safe transportation of patients. Also, the primary purpose of the scheme is to promote institutional deliveries and in case of need, it may be used for other purposes listed in the guidelines.

ANMs, ASHAs, community members have both driver and facility mobile contact numbers. ANM ensures that the vehicle is alerted one day prior to expected date of delivery.

Table 3: Overview of Local Partnership Based Patient Transport Systems in four states

	Local Partnership Tied up Vehicles	JE Vehicles per Lakh Population
West Bengal	700	0.77
Orissa	343	0.82
Madhya Pradesh	750*	1.03
Bihar *	~350- (one per block)	NA

*Bihar has also got a “108” service run by ZHL – 47 vehicles in 38 District towns.

Part II: PERFORMANCES OF THE MODELS:

Performance relates to its contribution to public health goals, its ability to meet standards of an effective emergency response system, and its costs as related to the services it provides. The study then also looked at the data that could relate to equity of access- the financial, geographic and social barriers to access that could exist. Finally it related it to other links of the emergency response chain- the pre-ambulance care, and the care at the facility where the patient was reached to.

The study was designed to look at this from both secondary data and confirm it from the sample of primary data.

Case- Study- 1: EMRI Andhra Pradesh

a. Turnover: (see table 5)

Performance of EMRI was studied in three districts viz. Anantpur, Warangal and Visakhapatnam. Anantpur had 40 ambulances, Warangal 40 ambulances and Visakhapatnam had 43 ambulances, which works out to an ambulance density of 0.98, 1.13 and 1.0 per lakh population respectively, in these three districts. This compares to the state average of 0.89- or 752 ambulances per 23 districts.

In each district the number of persons needing EMRI services per day is 140.8, 151.2 and 142.76 in Anantpur, Warangal and Visakhapatnam respectively. This works out to 3.52, 3.78 and 3.32 cases moved per vehicle per day in these three districts. This compares with the state level figure of 2700 emergencies per day or 3.59 cases moved per vehicle per day.

Table 4: Overview of Performance of EMRI in 3 Study District of AP

EMRI	Ambulance/ lakh population	Cases moved / vehicle/ day
Anantpur	0.98	3.52
Warangal	1.13	3.78
Visakhapatnam	1	3.32
Andhra Pradesh	0.89	3.59

b. The Effectiveness of EMRI.

This could be related to four questions:

- What were the public health needs or nature of emergencies for which EMRI was used? How many of these were life saving- where the presence of emergency care made a difference.
- Of all the emergencies and pregnancies that take place and who seek to come to a facility, what percentage accessed EMRI as their mode of transport?
- Who were those who were left out – what were the nature of emergencies and why were they left out?
- What was the timeliness of the services?

To answer the first question we took a sample of health facilities to which EMRI took cases and then in these facilities at the door questioned every consecutive entry till we reached our required sample size. This method could slightly over estimate EMRI service efficiency as there could be facilities where all emergencies received were from non EMRI route- because they were not part of the MOU. But such was rare and such as all public health facilities were necessarily included, and most private hospitals which could deal with emergencies had joined in.

As per the table no 6, of all the cases in the sample (375 cases), 163 (43%) used EMRI ambulances and 212 (57%) used other vehicles. This shows that although the utilization of EMRI vehicles is quite significant, it is less than half of the total cases needing ambulance.

Of all the cases transferred by EMRI ambulances, 29% were delivery related (of which, 56% were emergency obstetric cases), and 20% were injury/burn/trauma cases.

When compared to the non-EMRI mode of transport, it seems that 25% of such cases were delivery related (of which 57% were obstetric emergencies) and 18% were injury/burn/trauma cases. Although it seems that EMRI focuses proportionately more on delivery and injury/trauma cases, the difference (with non-EMRI mode of transport) is not very significant. It is evident from the data that EMRI or not, deliveries are a major reason for use of transport to go to the hospital. There is a good match between patient's sense of what is an emergency and the clinical diagnosis with a small trend for service users to over-diagnose obstetric emergency as compared to clinician judgment. But this could be because of the pregnant woman may have had urgent need of the transport, but by definition since it was a normal delivery did not constitute an emergency from the clinicians viewpoint.

Type of emergency has therefore little to do with use or non use of the 108 service.

Table 5: Type of Emergency and Usage of Ambulance by patients

Type of Emergency	Using 108 ambulances		Using other non 108 vehicle	
	As per Respondent	As per clinical diagnosis	As per Respondent	As per clinical diagnosis
1. Abdominal pain	5	5	6	6
2. Allergic Reactions	2	1	2	3
3. Injury/burn	33	33	39	39
4. Cardiac/cardio vascular	3	3	2	3
5. Diabetes	3	2	2	2
6. Disasters	0	0	0	0
7. Epilepsy	0	0	4	4
8. Fever/infections	9	9	17	17
9. Neonatal emergency	3	3	7	7
10. Paediatric emergency	3	3	10	10
11. Normal delivery	20	21	15	23
12. Obstetric emergency	28	27	39	31
13. Respiratory	5	5	7	7
14. Stroke	9	9	9	9
15. Others	40	42	53	51
TOTAL (no. of cases sampled)	163	163	212	212

Studying the non users further, we find that of the 212 who had not used the EMRI, 21 (5.6%) had called EMRI. In one case, the call did not connect. In ten cases the patient was told that it was not possible to send the vehicle because it was on another call- time-out. And in ten the vehicle was assured and perhaps despatched, but the vehicle did not come in time or by the time it came the patient had left by other means. Only 8 people had not heard about EMRI; which means that the awareness level about the presence of such an emergency service is high. Then why was the choice made. We do not have quantitative data, but the qualitative interviews showed the following causes

- a) In pregnancy, prefer not to use emergency transport, which seems more like an accident had happened or something else is seriously wrong.
- b) Did not know that the services were cashless and was worried that we could not pay for it.
- c) EMRI was not felt as needed due to short distance.
- d) EMRI does not usually come- and we prefer to go with the one readily and more surely available.

There is one caution that GVK-EMRI management makes on the review which is well taken- namely that some of those who came to by non EMRI vehicles were not genuine emergencies that would have qualified for EMRI dispatch. We had taken care to avoid such confusion, by only taking consecutive patients arriving at casualty and at different times- when and where ordinary non- emergency patients are unlikely to be entertained- but still this factor could be kept in mind.

Most persons who were shifted by EMRI received some medication and care along the way administered by the paramedic. There are no systems for care before vehicle reaches to be either sought or given.

One important observation is the relatively large number of deliveries that happen during transfer. EMRI report having conducted 450,000 deliveries on board since it started out- and though a mere 2.5% of all pregnancies shifted, is still a number that signals more attention.

c. The Timeliness dimension

As against the standard norm of EMRI of reaching emergencies within 20 minutes, the data shows that in 67 out of 163 cases (41%) the EMRI vehicle reached within 20 minutes. In most of the cases (74 /163 or 55% of the sampled cases) the EMRI ambulance took 20-50 minutes to reach the emergency site. Further in 13% of the cases, the EMRI took around one hour to reach the site of emergency. It may also be noted that of the 19 cases where EMRI took less than 10 minutes, 7 cases actually had to come to the pick-up point on their own, and the time taken by EMRI was till the pick-up point and not the site of emergency. Overall, there were 12 cases (7%) where EMRI could not reach the site of emergency and the patients had to be brought to the pick-up point on their own.

Regarding time taken to reach the hospital from the emergency site, in the case EMRI, 63% of the cases were transferred within 20 minutes and 90% of the cases were transferred within half-an-hour from the site of emergency. (For details refer to table no 6)

Table 6: Time taken for ambulance to reach emergency site, pick-up point and hospital

Time taken (minutes)	EMRI ambulance			Non-EMRI vehicle	
	Emergency site		Patient to reach pick-up point for EMRI	Emergency site	
	EMRI ambulance to reach site of emergency	EMRI ambulance to reach hospital from site		Vehicle to reach site of emergency	Vehicle to reach hospital from site
Less than 10 mnts	19	52	7	177	41
10-20 mnts	48	51	1	26	57
20-30 mnts	42	43	3	8	41
30-50 mnts	32	9	1	0	17
More than 50 mnts	22	8	0	1	56
TOTAL (no. of cases)	163	163	12	212	212

On an average, the EMRI ambulances took 33 minutes to reach the pick-up point and 21 minutes to reach the hospital from the site. Clearly, the average is more than the EMRI claim of 20 minutes.

An interesting comparison is with those who came by non EMRI vehicles. As many as 83.5% got access to vehicle within 10 minutes and almost 95% within 20 minutes- but only 46% could reach the hospital within 20 minutes. The quicker availability of the non- EMRI vehicle is not surprising and certainly not a reflection on EMRI quality for local vehicles would be available easier. But what is worth noting that is they took longer - as many as 26% took over an hour to reach the hospital-since these were further away sites.

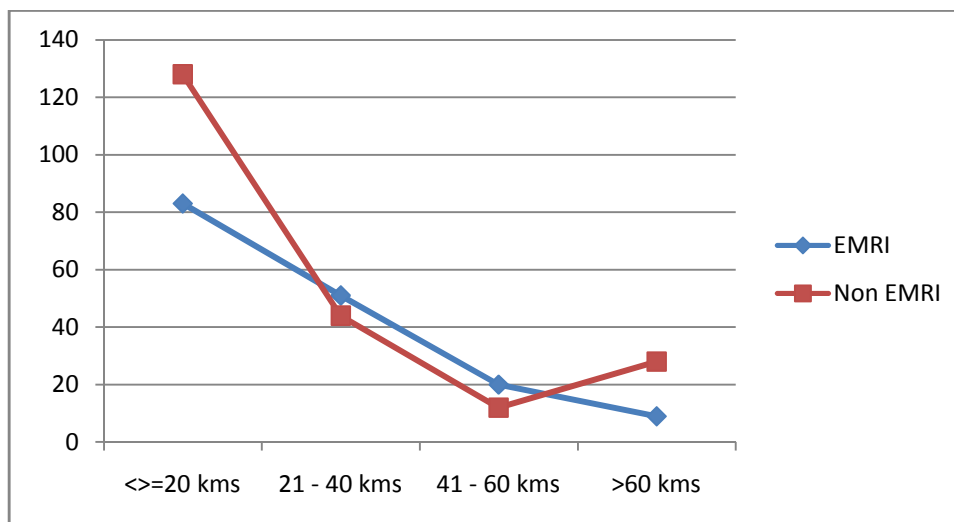
Table 7: Distance of Hospital from the site of emergency

	EMRI		Non EMRI	
	Frequency	Percent	Frequency	Percent
<=20 kms	83	50.92	128	60.38
21 - 40 kms	51	31.29	44	20.75
41 - 60 kms	20	12.27	12	5.66
>60 kms	9	5.52	28	13.20
Total	163	100	212	100

What emerges is that both for sites very near to the hospital and those very far, EMRI is not as frequent a choice as it is for those with a distance range between 21 and 60 km. At closer distances local transport is available and further away, the zoning and nearest drop off policy of EMRI will not allow for patients to use. But at the mid-range its *efficiency* over other means of transport is highest. This is not to deny the important role that 108 services play even in remote areas- but in terms of efficiency- time to reach, time to turn around- it starts dropping fast- requiring more ambulances handling lesser case

loads, which means a costlier service to achieve the same standards or relaxing standards -of timeliness, more frequent time-outs etc.

Figure 1: Distance of Hospital from the site of Emergency



d. Equity dimension

Five parameters of equity (i.e. age, gender, financial constraints, physical or geographical, and public hospital share) were looked upon while commenting on the equity dimension of performance of EMRI model.

The average age of patients moved through EMRI is 34.54 years (below 15yrs 4.2%, 15-44 years 64.23% and above 45 years 31.57%). Out of 163 EMRI users in our sample, 58.28 per cent were women and 41.72 per cent were men.

Only 3 out of 163 patients had to pay out of their pocket for transport. By far, the service is genuinely cashless and there are no financial barriers to access.

87 per cent users were from rural areas- but as the distance from the urban centre/block hospital increases, the likelihood of use decreases. Non users using alternative means are more likely to be from further areas- as evidenced by a decreased time to access the vehicle, but a much longer time for vehicle to reach facility in non users.

Also Public Hospital Share of patients moved by EMRI in Anantpur was as high as 90 per cent, while in Warangal and Visakhapatnam 60 per cent of the patients were moved to public hospitals.

In a response received from GVK- EMRI its CEO clarified “It would be worth noting that the EMRI ambulances transports all patients to the government or private hospitals based on criteria of nearness, appropriateness and patient choice. If the patients/attendees opt for a private hospital – which is purely their decision- with neither the private hospital with an MOU or GVK staff having any say, the consent is taken for admission in private hospital in writing and then only transported there. Since inception 76% of patients were admitted in government hospitals and only 24% of patients were admitted in private

hospitals. When the 108 users mostly consist of low socio-economic status- 67% rural, 45% SC/ST and 90% white card holders) selection of private hospitals is less likely to happen. In fact 108 services have increased the utilization of local public health systems like PHC and CHC.”

The study would endorse the CEO’s submission:

Table 8: Emergency cases transferred by EMRI/ non EMRI vehicles to Public/ Private Hospitals

Type of Emergency	EMRI		Non-EMRI		Total	
	Govt. hosp	Pvt. hosp	Govt. hosp	Pvt. hosp	Govt. hosp	Pvt. Hosp
1. Abdominal pain	5	0	3	3	8	3
2. Allergic Reactions	0	1	1	2	1	3
3. Injury/burn	29	4	17	22	46	26
4. Cardiac/cardio vascular	2	1	0	3	2	4
5. Diabetes	2	0	0	2	2	2
6. Disasters	0	0	0	0	0	0
7. Epilepsy	0	0	2	2	2	2
8. Fever/infections	8	1	5	12	13	13
9. Neonatal emergency	1	2	2	5	3	7
10. Pediatric emergency	1	2	2	8	3	10
11. Normal delivery	20	1	20	3	40	4
12. Obstetric emergency	23	4	19	12	42	16
13. Respiratory	4	1	1	6	5	7
14. Stroke	8	1	2	7	10	8
15. Others	35	7	28	23	63	30
TOTAL	138	25	102	110	240	135

As seen from the above table, people in general prefer government hospitals in case of emergencies as 240 out of 375 cases (64%) sampled went to government facilities. It was also seen that EMRI users had an ever greater likelihood of care-seeking in public health sector (139 out of 164 cases, i.e. 85%), whereas non-EMRI vehicles are relatively more evenly distributed between private and public hospitals (110 out of 212 cases, i.e. 52% choosing private hospitals).

Looking at the type of emergency, if it is a pregnancy, and that too a normal delivery, then irrespective of transport chosen, the woman was much more likely go to a government facility (82 out of 102 cases – 80%). In an obstetric emergency too, though the preference was more for government hospital, amongst non-users there was a much larger, though still a minority, which went to private sector care. For newborn and pediatric emergency, though numbers are small, both in EMRI and non EMRI use the preference is to the private sector. In NCD emergencies- the EMRI user tended to be clearly going to public sector and the non EMRI user to private sector.

One pattern worth noting is the public hospital preference for EMRI is “injuries” in 29/31 patients and a private hospital preference for non-EMRI vehicles, where 22 of the 39 non-EMRI cases (56%) were taken to private hospitals.

The patterns of preferences are determined by a) availability of services and b) geographical access and c) service user's preference given higher financial costs of a private sector admission. *It is worth noting that the cashless service for 24 hours in any private sector hospital brought a patient was not happening.* Though we have no data on whether there was exclusion and denial of care for reasons of non affordability/non-payment, such an apprehension should be entertained and explored further.

The Emergency Response chain and availability of Emergency Services:

More patients go to private sector for pediatric and newborn emergencies, because government hospitals, even the district hospital has a weak reputation in this area. Most EMRI patients are dropped off at the nearest hospital which has an MOU in that zone- irrespective of whether they have the required emergency care sought. In case the requisite care is not there, it is up to the patient and the hospital to find a way to move further. Thus in most geographic areas, which are away from the district town and urban concentration, the first choice is the public hospital sheerly due to the principle of zoning and access. When it comes to deliveries they invariably have what it takes to provide emergency care, but in all the rest it is uncertain. Knowing this and having some personal choice if conscious and in a position to make it, the patient may prefer to ask for a private sector drop, or a larger district hospital. In many cases local flexibility is shown and irrespective of rules, EMRI would try to accommodate it, but more often, they would be unable to do so. The inability of the system to match assured rescue and retrieval of the emergency with assured services for emergency management is perhaps the weakest link in the ERS chain- and like all chains; the chain is only as strong as its weakest link. Thus in terms of outcomes, in terms of deaths and complications avoided, if a patient is not provided care where he is deposited, but after that has to proceed further on his or her own costs, and there are no systems to tell where such care would be available, then the system does not work at all.

We have received a response from the CEO of GVK EMRI which we quote: "GVK-EMRI has its own referral matrix to coordinate between the hospitals and ambulances to take the patient to the nearest site where the emergency can be managed. Victim arrival intimation to the hospital authorities is by the Emergency medical technician in ambulance en route itself as part of a pre-defined process. Further I mass casualties; victim arrival intimation is done by the emergency response centre itself. However for effective implementation proper resource setting at the receiving hospital is necessary."

It is difficult for us to go back and check our impressions. What could be a consensus is that this matching of transfers to hospitals where facilities to manage that category of emergency is an achievable goal. The focus now shifts to each district health plan specifying the list of assured emergency services that would be available in each facility and making it available to the ambulance service. The Plan should assure the availability of appropriate hospital based emergency care for every type of emergency within the district, and within a time-span of one hour or less of vehicle travelling time- including both pick-up and drop. This indeed is the direction of movement suggested by the working group on NRHM for the 12th Plan. A clear plan of the nearest site for every type of emergency to receive in-patient life saving care

Case studies from the field

Example- 1:

1. A lady belonging to Sodasapalli of Darnasagar Mandal in Warangal district due to some family disputes, on 23/06/2011 at morning 10:15 took poison. Then some of their family members observed her condition and immediately called 108 ambulance services. 108 staff told them that they are sending ambulance. Their family members without waiting took the auto and went opposite to “108” ambulance. When they travelled about 10 km, the 108 ambulance came picked up the patient and shifted to the Life Line hospital within 20 minutes. After that, the hospital staff received well and kept in ICU and provided good services and told the patient family that they can tell the patient condition after 24 hours. They paid Rs 20,000 for the treatment.

Points being made: 1. Supplemental role of local transport. 2. Correct disembarkation point chosen- but there are high cost implications for this. This is where synergy with a JE type arrangement would help. The scope of such partnerships between different types of patient transport provision- and linking with a much larger voluntary and private transport providers should be explored.

Example: 2

2. A resident of Marepalli village, Devrapalli Mandal in Visakhapatnam District was suffering with the fever for the past few days. Gradually his health condition was deteriorated and became very serious. At that time his family members called “108” ambulance. Within 15 minutes “108” ambulance came, picked the patient and went to Chodavaram Government Hospital, left him at the hospital and went away. Looking at the seriousness of the case the Medical Officer referred the patient to Visakhapatnam. Then the family returned home and again called “108” ambulance, within 10 minutes “108” ambulance came, and they requested them to take the patient to Visakhapatnam hospital. “108” staff told them that the patient condition is not very serious and they do not provide services to Visakhapatnam. After a long argument 108 staff picked up the patient and left at CHC K.Kotapadu. MO CHC k.Kotapadu also referred the patient to Visakhapatnam. The family members again called “108” ambulance services. Same “108” ambulance and refused to take the patient to Visakhapatnam stating that it was a normal case and they are unnecessarily using the “108” ambulance. The family members showed all the documents from the hospital and reference of the doctor to the “108” staff. Following this “108” staff agreed and took the patient and dropped him at Visakhapatnam NRI hospital. The hospital staff admitted the patient, examined him and told the family members that the patient was in very serious condition and they have to pay more money for starting the treatment. The patient’s family members told them that they cannot pay that much money for treatment. Thus the patient was further referred to Bharathi Hospital and the patient came from NRI hospital to Bharathi hospital in auto.

Point being made: There are serious issues in choice of place for disembarkation. Protocols of decision are uncertain and often left to argument and subjective interpretation. The above situation could also have been due to unwillingness and lack of permission for the “108” to travel outside its zone, which was later reversed. Inter-facility transfers and patient care during such transport could have been better done by the referring government facility. This is what the HSVS approach is best at.

Case-Study- 2: HSVS Haryana

The HSVS scheme was studied in three districts – Ambala, Hissar and Narnaul. The three districts had 14, 20 and 14 ambulances respectively, at a density of 2.02 per lakh population in Ambala, 1.26 in Hissar and 1.7 in Narnaul. This is part of the state wide fleet of 335 ambulances i.e. 1.32 per lakh population.

Turnover:

The total number of cases moved per vehicle was 2.85 for Ambala, 3.63 for Hissar, and 2.74 in Narnaul. This compares to a state average of 2.85.

Table 9: Overview of Performance of HSVS in 3 study districts of Haryana

HSV S	Ambulance/ lakh population	Cases moved / vehicle/ day	Total cases moved / day*
Ambala	2.02	3.31	46.34
Hissar	1.26	3.63	72.60
Narnaul	1.7	2.74	38.36
Haryana	1.32	2.85	909.15

*Number of Ambulances in Ambala=14, Hissar=20, Narnaul=14 and Haryana=319

Public health dimension

The utilization pattern of HSVS services shows that use as an emergency response is 40 per cent, transport to home is 33 per cent, inter facility transfer 21 per cent and other transportation is 7 per cent.

Of the Emergency Responses; pregnant women transport were 75.9 per cent, road side accident cases 10 per cent and Medical causes- 14.1 per cent.

Table 10: Type of Emergencies in the three study districts of Haryana

Type of Emergency	Number of Patients (Percent of Total)	
	Users of HSVS	Users of other vehicles
Abdominal Pain	1(0.4%)	6 (2.2%)
Allergic reactions	0	8 (3%)
Injury/burn	1(0.4%)	25 (9.3%)
Cardiac/cardio vascular	2(0.7%)	7 (2.6%)
Diabetes	1(0.4%)	0
Fever(Infection)	4(1.5%)	56 (20.7%)
Neonatal emergency (up to 1 month)	0	3(1.1%)
Pediatric emergency(up to 12 year)	0	1 (0.4%)
Normal delivery	190(70.4%)	67 (24.8%)
Obstetric emergency	34(12.6%)	19 (7%)
Respiratory	0	9 (3.3%)
Stroke	2(0.7%)	6 (2.2%)
Others	35(13%)*	63 (23.3%)
Total	270(100%)	270(100%)

*78.7% of users who cited others as reason for using ambulance services had come for ante-natal check-ups.

Table 11: Type of Emergencies handled by HSVS in the state of Haryana

Types of cases transferred	Number of cases	Percent of total cases transferred	Percentage *
Pregnant Women	99075	39.29	61.66
Road Side Accidents	13831	5.48	8.61
other emergencies	46201	18.32	28.75
Referred between health facilities	51364	20.37	
Back home	39825	15.79	
Eye donation	34	0.01	0.02
VIP/Sports	1545	0.61	0.96
Total Cases Transferred	252192	160686	100.00

*After removal of referral between hospitals and Back home cases

Among pregnant women who used the service, 70 % used for normal delivery and 12.6 % used for obstetric emergency.

Even in pregnancy those using HSVS service were generally less complicated than those reaching the health facility by their own means. Whereas from the secondary data for year 2010-11 shows that 39.29 percent pregnant women used HSVS, 20.37 per cent were referral between health facilities, 18.32 per cent were other emergencies, 15.79 per cent were drop back cases and 5.48 per cent were road side accidents. (Refer to table no 10).

The HSVS is a purely patient transport arrangement- as its name also implies. It neither intends to nor provides any emergency care en route. But in patient transport it is able to offer both inter-facility

transfers and what is most important a drop back home. Since the drop back home may take multiple patients in a single trip- the number of patients transferred is usually more than the number of trips made.

The Timeliness dimension

Average time taken by the ambulance to reach the site of emergency after receiving the call was found to be 18.8 minutes and average time taken by HSVS to reach hospital from site of emergency was 21.7 minutes.80 per cent of the patients who used HSVS services were brought to hospital within half hour of reaching the site of emergency.

The mean distance travelled by the ambulances per call in the state is 35 Km. The services were used mostly between the time from 8 hrs – 14 hrs (45%), 26% used the service during the night time (20.00 to 8 hrs).

Table 12: Time taken for the ambulance to reach emergency site and back to the hospital

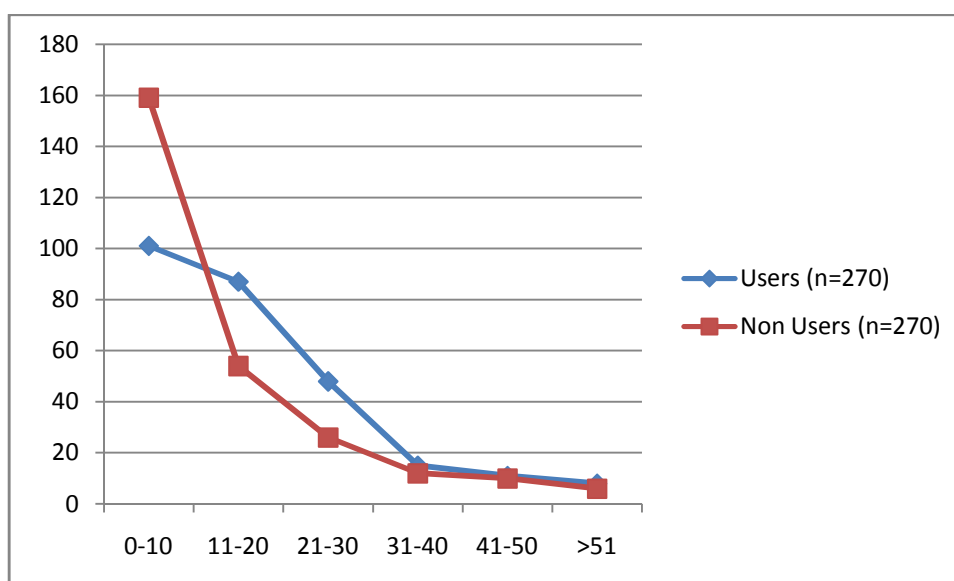
Time taken by HSVS vehicle for a trip				
Time taken (in minutes)	Ambala	Narnaul	Hisar	Haryana
Within first 5 mins.	0.5% (0.5)	2.6% (2.6)	0.4% (0.4)	0.4% (0.4)
6- 10 mins.	3.2% (3.7)	1.3% (3.9)	5.3% (5.7)	2.4% (2.8)
11-15 mins.	7.8% (11.5)	2.3% (6.2)	11.1% (16.8)	5.3% (8.1)
16- 30 mins.	33.7% (45.2)	10.3% (16.5)	47.6% (64.4)	30.1% (38.2)
31 mins- 1 hr.	41.4% (86.6)	39.3% (55.8)	35% (99.4)	44.1% (82.3)
1 hr- 2 hr	11.2% (97.8)	31.7% (87.5)	0.4% (99.8)	13.9% (96.2)
>2 hr	2.2 % (100.0)	12.5% (100.0)	0.2% (100.0)	3.8% (100.0)
Average time taken by HSVS and other vehicles for a trip				
	To reach site of Emergency (min)		To Reach Hospital (min)	
Average time taken by HSVS	18.8		21.7	
Average time taken by other vehicles	30.8		9.7	

The pattern of usage shows that the number of users reduces with increase in distance (both in users and non users of HSVS) and 70 per cent of the users and 80 per cent of the non users were less than 20 km away from the hospital. (Refer to table 13). Above a distance of above 40km the possibility is that patients were choosing another site of care and perhaps another ambulance – as both users and non users are low. But between 20 and 40 km, a larger number of persons had preferred HSVS indicating a maximal value addition for only patient transport arrangement in this distance range. At very short distances there are other alternatives available for patient transport and these could be preferred

Table 13: Distance of Hospital from the site of Emergency

Distance traveled	Users (n=270)	Non Users (n=270)
0-10	101 (37.5%)	159(59.6%)
11-20	87 (32.3%)	54 (20.2%)
21-30	48 (17.8%)	26 (9.7%)
31-40	15 (5.6%)	12 (4.5%)
41-50	11 (4.1%)	10 (3.7%)
>51	8 (2.6%)	6 (2.2%)

Figure 2: Distance of Hospital from the site of Emergency



The Equity dimension

Major chunk of the patients (95%) belonged to the age group of 15-59 years and the mean age 25 years. 88 per cent of patients who used the services were females. 95 per cent people who used the services were poor. 86.2 per cent belonged to rural areas and 13.8 belonged to the urban areas.

No significant Out of pocket costs for patients using HSVS were encountered.

More than 95 % of the patients referred to public hospitals, majority being transported to district hospital (25 to 40%).

The utilization of emergency services was found to be pro- rich (Concentration index= 0.05) among those who used private means of access. This service was used predominantly by the poor among those who utilized HSVS services (Concentration index value= - 0.05), an indication that the HSVS service was making health care utilization more equitable from income perspective.

Reasons for non-use- model HSVS

This was based largely on qualitative interviews with the non users in the same hospitals.

“Lack of information” was the main reason for non utilization of the services. This was especially true for “Uses beyond pregnancy” which were not advertised almost as policy.

“In pregnancy: High time taken for arrival- chose another vehicle” was the most common reason. The standards of time arrival decrease clearly as one moves away from the block hospital where the ambulance is stationed. On the other end there is also a “Too near to hire an ambulance”- the alternative transport is available and in the context of HSVS being a paid service, is cheaper also. Thus only pregnant women living in a particular distance range would be prime users. Since this a patient transport system with no provision of care en-route, other emergencies living further off had alternative patient transport which were faster and emergencies living closer had alternative patient transport which were cheaper.

Case Study- 3: Janani Express Nabrangpur(Odisha).

The total number of patient transport vehicles deployed in Nabrangpur is 22 (11 JE and 11 Mini-JE⁷) vehicles. This works out to a density of 0.82 vehicles per lakh population. The number of patients it has shifted comes to 1.73 for Janani Express- located at the block HQ- and 0.89 for a mini- Janani express- located in a PHC. Over a year, both taken together the average is about 1.5 cases per vehicle.

In the state, as whole, 343 vehicles have been tied up under this scheme.

Table 14: Overview of Performance of JE in Odisha

Janani Express	Ambulance/ lakh population	Cases moved / vehicle/ day	Total cases moved / day
Nabrangpur- district Odisha.	0.82	1.73	539.39

Public health dimension

Majority of cases transported through Janani or Mini Janani Express are pregnant women before and after deliveries.

Rest of the cases includes sick neonates, infants and children for emergency care and support. These are relatively few, and only recently has it opened up to this. The JE/Mini JE is also used at times of epidemics in the area.

In 2010-11 in the district, Janani Express has moved 6943 pregnant women and 34 children, while Mini Janani Express has moved 3567 pregnant women and 12 children.

⁷Mini JE vehicles are those vehicles that are parked at PHC (New) and the monthly rent paid to the owner is Rs 10000, while JE vehicles are those vehicles that are parked at the CHCs and PHCs and the rent paid to the owners is Rs 13,500.

One immediate impact was a significant increase in institutional deliveries in PHC's. The context of Nabrangpur must be kept in mind. Geographically it is a widely dispersed population with poor road connectivity and few all weather roads, and considerable forested areas. Socially it is an almost completely tribal area, with very poor development of public transport, though mobile connectivity has improved well. Further a large number of blocks are affected with left wing extremism. Health systems context is of few functional facilities, no ambulance services and an about 14% institutional delivery rate. All in all it is about as difficult as it ever gets.

One interesting feature of the Nabrangpur model is the way that assured referral transport and assured facility based care, was developed in tandem. Even pre-hospital care – in this case by the ASHA-developed in synchrony.

In March 2010 as part of the process of planned facility development under MCH panning (refer to the operational guidelines for MNH) the state categorized a sub-set of all public health facilities into L3, L2 or L1 facilities. The L1 facilities were a sub-set of facilities which did not have a full team of doctors and nurses, nor could manage complications, but were nevertheless to be made into institutional delivery sites for providing assured access to skilled birth attendants providing a safe delivery and to assured referral transport if complications were encountered. The L1 facilities were thus by definition within 20 to 30 minutes of villages which had no other access to institutional delivery services and in Nabrangpur it was invariably a PHC at block headquarters that became a L2 facility and about one thirds of the PHC(New) became a L1 facility. Most PHCs (N) in the district were manned by AYUSH doctors or Pharmacists. To each L2 facility, a JE was contracted-in and to every L1 a Mini-JE was contracted-in. In parallel the existing AYUSH doctors or nurses in the PHC(N) which were chosen to be designated as L1 facilities were given the skills needed for providing safe delivery and newborn care.

The case study of CHC Kosagumunda is illustrative. The medical officer in charge of the CHC was interviewed. The medical officer, who has been working at the same facility since 2004, reports that at the start of NRHM there were only 4-5 deliveries being conducted per month at this facility. After the inception of JSY this shot up-to around 100 deliveries taking place in the facility. Since 2010 with the introduction of Mini Janani Express in the PHCs (New), the number of deliveries taking place in the CHC have reduced to 50 deliveries (approximately) per month. The rest of the caseload of normal deliveries is now being handled at those lower level facilities- PHC(N)- which are designated L1 and the total numbers being provided this service in the block as a whole has increased.

The case study of Patraput PHC (in another neighboring block) is also illustrative. Earlier this PHC (N) which functioning only as a dispensary for OPD cases and manned by an AYUSH doctor. For the villages in its catchment area, there were no alternative sites for facility based medical care, and even to reach this facility was a problem- with distances ranging from 3km to 25 km. Patraput PHC (N) was therefore designated as L1 and the AYUSH doctor (who was already posted) was trained in SBA and is now handling IPD cases and deliveries. The number of deliveries has gone up-to 40 per month. The mini-JE posted here ensures that every pregnant woman in the 30,000 population he serves is identified and brought in time to the PHC. Complicated cases are referred to the district hospital using the Mini Janani Express. In contrast to most other places, where the coming of the patient transport rendered the local

PHC redundant- with women being ferried to higher facilities- in Nabrangpur it made the local facility more functional.

One interesting fact that emerged in this interview was that about 3-4 cases of home delivery or delivery in the vehicle happen per month as the condition of the roads is very bad and becomes even worse in the rainy season. When the calls come from distance more than 15 km, the time taken to reach the point of emergency and coming back to the facility is more- it could become as much as one hour. Sometimes they reach the home, only to find that the delivery has taken place. Since it is only the driver on the vehicle there is no care that is given either at the home, or during transport.

The equity dimension

The majority of the users are pregnant women in labor. Now the service is extended to newborn and sick children- but this is only picking up. Though this is meant exclusively for pregnant women, in case of other emergencies, medical officers and drivers do exercise their discretion- but are cautious about claiming this. Almost every single village, even in very remote areas are able to access this services- but perhaps on some sub-block segments, it could be improved. A rigorously drawn sample survey of pregnant women in the community (done as part of the JSY study) showed that almost 70% of all pregnant women came to hospital using this service- whereas the best figure we have for any assured referral transport system whether of the EMRI model or the HSVS model is in the range of 30%. In some areas it rises to over 85%.

Majority of pregnant women are referred to public hospitals. If there are complications it is to the district hospital or to the one accredited mission hospital at the district level. The model provides good outreach to every single village and the peripheral facilities are not bypassed for more central ones. The survey is cashless, and there is no out of pocket cost for patient moved. However some instances of informal charges have been demanded by the driver while dropping back home from the facility were reported.^{8,9}

Non use and the JE Model

No specific reason was reported for non use as those who did reach the facility almost always came by Janani Express or had their own transport or other even more convenient means. But we must note that in this district as compared to our other case study areas, many more delivered at home. There is an increase of institutional delivery from 14 per cent to 50 per cent, but of the 50% of women in Nabrangpur who delivered at home, many may have done so because of lack of access to the transport.

⁸ As reported by ASHAs during the interactions with the study team.

⁹ As reported by Beneficiaries during the interactions with the study team.

PART III: COSTS, FINANCING AND GOVERNANCE OF THE THREE MODELS:

Costs:

EMRI: The Cost per vehicle deployed is Rs. 12.59 lakhs per year or about 1.05 lakhs per vehicle per month. This also worked out to about Rs 565 for transporting one patient from the point of emergency to the hospital.

We need to note that a) EMRI provides for pre-hospital care, not just patient transport, which means a trained and supported emergency paramedic on the vehicle b) that EMRI pays its staff better/more fairly and has three drivers per ambulance c) that EMRI has invested in management structures such that there could be renewal of investment and development of the model.

The state spends Rs 5.28 Cr per district per year on emergency transportation or *Rs 12-15 per capita*. This in our view is affordable.

We need to note that the EMRI CEO has in his response commented that the calculations shown by NHSRC are excessive. Their own estimate is at Rs 95,000 per vehicle per month. Which would mean about Rs. 11.6 per capita in Anantpur, Rs 11.4 in Visakhapatnam and Rs.14.3 in Warangal. This is not substantially different from NHSRC estimates. We note later that the Deloitte study puts the costs substantially higher, but they calculate it as a per trip cost.

HSVS: The Cost per vehicle deployed is Rs 4.3 lakhs per year in Ambala, Rs 3.36 lakhs in Hissar and Rs 3.37 lakhs in Narnaul or about Rs 35,800 per month in Ambala, and Rs 28,000 in Hissar and Ambala. The Cost per patient transported is Rs.674 in Narnaul compared to Rs. 549 in Ambala and Rs. 463 in Hissar. T

The state spends Rs 82 lakh per district per year on this service which is largely a patient transport service. (Annual Cost Rs 99 Lakh Ambala, 85 in Hissar and 54 lakh in Narnaul-) or Rs 8.71 per capita in Ambala, Rs 4.88 per capita in Hissar and Rs 5.86 per capita in Narnaul District.

The State Officer in a response to this study pointed out that in their state (i.e. Haryana) the cost per patient transported is only Rs.321/- and if revenue generated is also deducted then the cost comes out to only Rs. 303/-per patient transported. This includes all the types of cost including control room expenditure. (See annexure for full comments). We note that due to differences in the way costing is done, different sources come to different figures. Also the experience varies across districts. Further the general point that it would be two-thirds to half the cost of the 108 model but with much lesser features also stands.

Janani Express: The Cost per vehicle deployed is Rs 1.74 lakhs per vehicle per year or Rs 14,500 per vehicle per month. The cost per patient transported is Rs 391.08.

The annual cost for the whole district is only 28 lakhs and this money, the district has found within the existing budget- with no head for either emergency response or patient transport. The range of use is however very limited, though for that particular use, it has a higher efficiency than all other systems- which considering the context is truly remarkable. At this time and day- this innovation- by itself has

little use. Since much better alternatives have arrived. However it remains a very useful way of supplementing the dial 108 approach- filling in local gaps, providing that additional back-up, taking care of the trip back home, doing elective inter-facility transfers, transporting sick but non emergencies in dispersed tribal contexts etc- and these advantages should not be lost sight off.

Though the EMRI model costs more such comparisons are to be made in context. The EMRI provides a much larger set of services with many more vehicles deployed and therefore is affordable in absolute terms. It is only a question of whether the state government is ready to receive all types of emergencies and the investment it has made in facility development and trauma care development costs. If services are assured only for obstetric emergencies then there the other models suffice. However when moving towards universal health care, trauma and emergency care is our next goal for the 12th Plan- after RCH assured services are met- and therefore it is not time to take this to scale, even as the 12th Plan builds up “assured services” at the facility level for emergency and trauma care”.

The absolute costs per district are higher for the dial 108 model because of

- a) Larger number of trips made per vehicle
- b) Larger spectrum of emergencies catered to: over two-thirds of its cases do not relate to pregnancy and the call-centre, serves the fire and police departments which incidentally do not pay for the services they receive.
- c) The provision of on the way stabilization care with a telephonic back-up.

If we adjust for these factors, and then re-read the cost per patient shifted and compare it across the three models we could conclude that the costs are comparable- per unit of service provided. Thus the cost of transport per person works out to Rs 565 in the three districts of Andhra, which is only 1.4 times the JE per patient cost of Rs. 391 and only 1.2 times the cost of HSVS in the most efficient district – Rs 463 per patient shifted. In some of the districts, the cost per patient is much more. Because of a much better volume of patients shifted the fixed costs are going to contribute less to per patient costs, or in other words the capital investment made is much more efficiently utilized.

There are problems with the way the costs per patient are computed in the three instances, and if we go by the statement of the current CEO of EMRI their current costs are down to Rs 425 per patient shifted- which would lead us to believe that in the least all three models are comparable in costs- and also therefore quite affordable. But then the other CEOs also project lesser costs. The choice is only of what package of services we intend to provide, what quality standards we intend to meet.

These depend also on issues of financing as a governance issue and we examine this next.

Table 15: Costs of ERS in the States of Andhra Pradesh, Haryana and Odisha

Name of the State	State Popn. (In Lakhs)	No. of ambulance	Ambulance density	Cost per Trip	Cost/vehicle / mnth (lakhs)	cost per dt. Per yr. (in lakhs)	Cost per capita (in RS)
EMERGENCY REPOSE SERVICE Andhra	846.66	752	0.89	565	1.05	528.78 (Avg)	14.36
PATIENT TRANSPORT SYSTEM- Haryana	253.53	335	1.32	562	0.31	82	6.79
LOCAL PT. TRANSPORT SUPPLEMENTATION- JE-ODISHA	419.47	343	0.82	391	0.15	28	2.00

*Costs calculated on the basis of study districts of respective states.

Financing and Governance in the three models:

The financing of EMRI in the initial years including capital or operational from the central government expenditure routed through the NRHM flexible pool. The government provided 100% capital expenditure for procurement of ambulances and infrastructure and also provided 95% of operating expenses. The rest 5% contribution comes from the private partner EMRI as their share in the PPP initiative.

From the year of 2009-10 onwards, in the first year the centre would pay all the capital costs and 60% of operational costs. In the second year the centre would support 40% of operational costs and in the third year 20% of operational costs and subsequently the centre would have no financial commitment. The state would have to bear 40% of operational cost, 60% in the second year, 80% in the third year, and 100% subsequently. The operating costs are currently estimated at about Rs 12 to Rs 17 lakhs per ambulance per year (including an annualised replacement cost of approx. Rs. 3 to 5 lakhs per year). This decision brought more fiscal prudence into the thinking of states, and slowed down the expansion of the EMRI dramatically as states came to terms with the costs of the scheme. However by 2011, the popular welcome for the scheme and more important the strengthening of the facilities to respond to emergencies brought attention back to the ambulance services, and more slowly, but steadily the programme has been expanding.

One of the main findings of the first NHSRC study on EMRI had been the lack of any financing plan- and a financing approach to pay whatever was the bill provided. The system was depending only on the internal professional management skills of the private management to hold down the costs- and there were insufficient incentives or monitoring of whether this was done at all. In introduction of tendering, instead of single source nomination, has made cost regulation more likely, but as we shall see in a later section it has brought its own problems.

Haryana Swasthya Vahan Sewa: Financing and Governance:

State receives funds under the head of referral transportation through NRHM. The state then releases the funds to the districts. A separate account in the name of referral transportation is created at district level. All funds from the state are deposited in the same account.

Districts spend funds under the heads – HR, Maintenance, Insurance of vehicle, GPS charges, POL, call centre.

POL charges are paid directly to the Oil Company, with which it has a tie-up. Each vehicle driver is provided with a petro card which can be used at the Oil Company's Petrol Pumps and there is cashless refill of petrol for the vehicle.

Revenue generated from the user fees collected from the APL @ Rs 7/ km is deposited in the District Referral Transport account. The driver is provided with a receipt book. Every paid patient is given a receipt and the money is handed over by the driver to the fleet manager, who hands it over to the Accountant and finally is deposited in the District account. Total revenue generated from user fees is approximately 10 per cent of the total cost.

Total staff employed under the scheme is 775 operational staff (drivers, control room operators, fleet managers) and one Management staff (Medical Officer, Referral Transport)

Out of 335 vehicles, 179 were bought through NRHM and the others were state owned or Red Cross Society owned. At present Red Cross Society is functioning in Ambala only. In other districts the state government has taken over the vehicles and their operations.

Monitoring and supervision: One of the most interesting and effective innovations of the Haryana system is the use of GPS in monitoring. A GPS device is installed in all the vehicles. Every single call to the call centre is logged; and fed into the computer. The GPS tracking software continuously shows the position of the vehicle and ignition status of the vehicle along with the speed with which it is running. The GPS devices are linked to the ignition key and there is no separate on/off switch. Thus a driver cannot switch off the GPS device and hence the vehicle is tracked 24x7 by the software. The GPS tracking software generates a report automatically every day which includes the details of each vehicle, number of visits, distance travelled, and this is reviewed at the state and district level. It is mainly the fleet manager who keeps an eye on this data. In addition the driver has to maintain a log book which is cross checked by the Fleet Manager.

Note: In the responses received from CEO EMRI we are informed that "GVK EMRI are pioneering AVLT- in India and they have a project with the Government of Andhra Pradesh to install it on all their ambulances. AVLT or Automatic Vehicle Location and Tracking has the following features – a number of alerts for scheduled services, minor repairs, network disconnection, license of pilot linked to ignition, oxygen levels, speed, and it has automation of records including biometric attendance and it provides real time monitoring of vehicle and shows shortest routes."

Janani Express Scheme:

The JE scheme is totally financed from within available funds- POL from RKS funds and rent for vehicles from JSY transport funds of Rs 250 per case. (Rent Rs 13,500 per month for the Janani Express vehicle and Rs 10,000 per month for the mini Janani Express vehicle. Fuel payments are fixed as 1 liter of fuel per 10k.m.plusRs 3). There is no additional budget line for the scheme. Nor is there any additional managerial or supervisory staff deployed. There is one driver with the vehicle available on call.

Financing mechanisms are simple. There is a separate log book maintained for each vehicle and payment is based on this.

There is every possibility of both being able to expand it to more uses and emergencies- expanding both assured medical services along with retrieval of patients for the same. A second driver would need to be included. There is also a case to be made out for a nurse-midwife to travel with the vehicle- given that over 10 to 20% deliver on the way or have delivered by the time they reach. Or the ASHAs need more – pre-hospital care training and encouraged to accompany the mother. In non delivery emergencies, a trained paramedic available in the facility could travel with the vehicle to provide pre-hospital care.

However clearly this is a transitional arrangement of the past- not a model for the future. But even in future it would play an invaluable role as supplemental patient transport arrangement, especially in tribal areas, for a number of elective visits. Its cost-effectiveness is so high, that it could be added onto much more expensive ERS and patient transport costs, without affecting the budget by much, but improving the efficiency.

Cost Estimates in Deloitte Evaluation¹⁰

One problem with the costing that we present in this report is that it is done by different teams using different methods. We therefore cross checked our results with that of another study on the same issue done by Deloitte, commissioned by DFID and MOHFW.

According to the Deloitte study the cost per trip for their “Dial 108 Business Model” ranges from 670 in MP to Rs 762 per trip in Assam and Rs 555 in Rajasthan. Inclusive of capital cost, the costs were estimated as Rs 825 in MP, Rs 1105 in Assam and Rs 843 in Rajasthan.

In the Deloitte study the Haryana model costs Rs 358 per trip exclusive of capital cost and Rs 843 inclusive of capital cost and in the NHSRC study it was calculated to Rs 562 per trip.

The Janani Express as seen in MP costs Rs 524 per trip; and since there is no major capital cost involved Rs 530 inclusive of capital cost.

Thus in the Deloitte study the differential between “Dial 108” and the other models is much higher than what is seen in NHSRC estimate. But then; NHSRC was studying “Dial 108” and JE models at their best performance, when their efficiencies are near peak.

¹⁰ Annex 1 – Deloitte Study

PART IV- STRENGTHS AND CHALLENGES AND THE WAY FORWARD;

Since the dominant and more comprehensive model is the “Dial 108” we present below its strengths and weaknesses and the challenges and in the course of doing so, incorporate the lessons it could learn from the strengths and weakness of the other two models as well.

Strengths of the “Dial 108” Business Model:

- Dominant model of publicly financed emergency response systems in the nation- with- now close to 18 states committed to it.
- It is the only publicly financed model of care which provides for emergency care en route. Almost 78 per cent of the patients had received some sort of stabilization care in the ambulance.
- It has clear life-saving impact on road traffic accidents and injuries.
- It is emerged as the major form of assured referral transport services for care at child birth- both for normal delivery and for obstetric emergencies.
- The model is an adequately staffed, adequately financed, adequately advertised programme- with adequate investment in management personnel, structures and systems- which is in contrast to almost every other government health programme. It is ironic to reflect on, but no doubt the leadership style of Shri Ramalinga Raju, had much to do with both conceiving it thus and also getting it financed by the government.
- There are excellent standards of corporate management- There are no conflict of interests on which facility the patient is taken to, there are no informal charges being made from users, and there is good monitoring which identifies gaps and acts to rectify it.
- It is also the most successful public private partnership going. Essentially it is a management contract- as there is no investment that the private partner brings in, nor do they have any share in the risk. Thus it becomes a corporate social responsibility action. It is not designed as a commercially successful version which can recover costs, let alone give dividends. But for a management firm with specialisation in this area, it is an attractive contract to win.
- The call number has become well known and is a common channel to police, fire and ambulance services - even if health department is paying for all.
- Cost per trip has been coming down and is currently projected by EMRI at Rs 427 /- per trip of Rs one lakh per vehicle per month, which makes it “affordable”. Since the system aims for one ambulance per lakh population the costs could also be expressed as Rs 1/ per capita per month that the government spends towards assuring a timely and appropriate emergency response ambulance service which also does substantial elective patient transport. This is really affordable. This improved efficiency over time (from close to Rs 750 per trip in 2009), is by sustained quality of management, and the introduction of a limited level of competition.
- The threat of a monopoly in single private hands is much less, though not altogether gone- since we have only two proven players. However we should aim for a policy framework such that there are *at least* five or six reliable suppliers of these services across the nation.

Challenges before the “Dial 108” Business Model

- This has historically developed as a standalone emergency ambulance services with the rest of the emergency response chain, not developing in parallel. There is therefore no assurance of facility based response at the point of disembarkation. Merely taking the patient to any hospital with an MOU which is nearest- rescues the patient, but does not necessarily save them. The simple and modest way in which Nabrangpur expanded, first choosing a site of medical care provision, strengthening it to assure quality services, and then in parallel adding the ambulance provider is a principle to learn from. In the least for every emergency the nearest place where assured services can be provided for that emergency must be identified by the call centre and the ambulance asked to disembark the patient at the right place. In written comments received the CEO, GVK-EMRI states that there is a process of EMT informing the hospital of the in-coming patient and further the doctor at the emergency response centre also guides the ambulance to the right hospital. He also informs us that the government of AP is working on facilitating pre-arrival information from the ambulances to the receiving hospitals by providing emergency contact numbers of receiving hospitals district wise to make it more effective.” This is a very good development and will no doubt be a valuable step forward- but what we require is *a district plan to reach the minimum density and dispersion of assured facility based emergency medical services that the patients of all types of emergency can be taken to. The ambulance deployment is then linked to a getting the patient to the appropriate care provider within an hour.*
- There is a huge differential expenditure made on ALS and BLS, but on the ground no differential use made of these. The potential of ALS is not called into use. On the other side in many situations the ambulance is called upon to do patient transport- which is a waste of even BLS level resources. Inter-facility transport is not provided through EMRI* in many states, though some states have written it into the contract. Again the loss of clarity between patient transport systems which can afford to time-out for a longer period, and emergency response systems which cannot is being lost. Further in the current “Dial 108” model cannot and should not be expanded to drop back home- for it would increase time-outs from availability for emergency response.
- The current model of developing “Dial 108” makes the huge fleet of government ambulances redundant. (see table 16)That is not the “Dial 108” management’s problem, but it is certainly a design issue. In the HSVS model, efficient use is made of all already existing investment. The HSVS works very well for non emergency patient transport- drop back homes, and inter-facility transfer- and even the elective pick up of a patient from the village. But since it is coordinated from the district headquarters, it could even bring together two or three or even more patients for a trip, making for efficiency in patient transfers. These are not part of the “Dial 108” design. Clearly the “Dial 108” design must incorporate almost all elements of the HSVS into the model- so as to make efficient use of all available resources, and also undertake a number of essential tasks which supplement (and sometimes are even at odds with) the task of emergency response.

Table 16: Number of State owned ambulances in States providing “Dial 108” services

Sr No	States with EMRI	Government Ambulances in the state
1	Andhra	0
2	Gujarat	197
3	Uttrakhand	160
4	Karnataka	539
5	Tamilnadu	281
6	Assam	830
7	Himachal	206
8	Goa	38
9	Meghalaya	85
10	Chattisgarh	382
11	Madhya Pradesh	0
12	Rajasthan	363
13	Punjab	250
14	Kerala	238
15	Bihar	416
	Total in 15 states	3985

- Other than in life saving emergencies requiring pre-hospital care (eg cardiac emergencies, road traffic accidents), the value addition of “Dial 108” and HSVS is best in near urban areas with good population concentrations, and good road transport- but further than what the local auto or tempo usually travels. The further into the interior and away from the highways the village is, the less the efficiency and reach of the “Dial 108”- either taking too long to reach or demarcating a pick up point- which makes it necessary for considerable –pre-ambulance travel of the patient. Poor mobile connectivity also reduces “Dial 108” model efficiency in such areas. Knowing this problem, and to keep up its patient load factor, more ambulances are placed in cities and towns than in the large rural and remote swathes. In Bihar, MP, Chhattisgarh, there is even a conscious prioritisation to serving only urban areas. The paradox is that the peak efficiency of the model is in situations where alternative means of transport are readily available. Of course even here the 108 service is a life saver for it provides emergency medical care on the way. In difficult terrain or in dispersed populations we would either need a higher ambulance density and therefore a lower cost- benefit ratio, or we would have to settle for a lesser standards of timeliness, greater failed calls due to time outs etc.. One way out of this problem is try innovative synergies with alternative patient transport systems of the JE type- which supplements the dial 108 in some contexts and purposes.
- In remote, dispersed areas, the Nabrangpur JE has much to learn from. Clearly in all such areas the EMRI needs to be supplemented by local tie- ups. This could help bring in patients who need

transport; not pre-hospital emergency care- and should become an essential feature of all tribal health programmes. Even where care is needed, these could bring them to more convenient points for “Dial 108” to pick up. By investing more funds in the JE to take it beyond pregnancy care- it could be easily expanded to many more dimensions of care- for example- any loss of consciousness be it with fever or otherwise, any injury, any poisoning etc. Also where the PHC is gate-keeping and sending the patient for a referral consultation at the next higher level. It could be argued that these functions should not be included in a discussion of emergency response systems- but if we look at the NRHM architectural corrections as being synonymous with integration and decentralisation centred around the district health plan, then such integrated planning would be justified.

- Management of deliveries is to be thought through. EMRI no doubt does a huge service to the cause of safe delivery, with over 50 lakh pregnant women having been transported by it, since it began. However as we have seen, as distances and remoteness increase, the problems of quality of care also increases. One specific problem is the high number of deliveries “on the way”. EMRI CEO informs us that since the service began over 425,000 deliveries (about 2.35% of all pregnancies that were transported) have happened on the way. The more remote the place, the more likely this is to happen. But neither skilled birth attendance nor birth asphyxia management is part of the skill sets- of either the paramedic or of the accompanying ASHA. The loss of life would not be greater because of this gap, but we certainly are losing an opportunity to make it less. We note that the current paramedical training has some elements of this skill- but at least in contexts where such a service requirement is high, more investment in such skills is called for. This problem is also there in the JE model. Further in remote areas we often come across the ambulance reaching only in time to witness the delivery happening at home, or even in the immediate post natal period. It makes sense then to *re-visualise the vehicle as taking a nurse to attend to the delivery rather than as bringing the delivery to be attended by the nurse*. Certainly in a JE like situation, where the quality of skills available in a L1 site is not much different, and there is a high likelihood of delivery on the way or on arrival, and the frequency of use for deliveries is only one or two per day, it makes sense to place a trained nurse on the vehicle. Extrapolating further we can conclude there is advantage in building a system where a trained midwife accompanies even the “Dial 108” vehicle for all rural and remote area pregnancy calls. Existing staff nurses and ANMs who are trained but for reasons of changing sub-centre roles have no midwifery work load, may be incentivised to do so.
- The financing model in use brings its own hazards. In the earlier study we noticed a drive to maximise case loads- since it would maximise returns- in a “whatever it costs” approach. Such a misdirected incentive is less now, but still for reasons of efficiency and since payment is per trip made, the trend to use it for non emergency transport is high. There are many factors that drive this moral hazard of inappropriate consumption of the service. Some of these could be listed as:
 - The service is cashless for all- and if a long trip has been made for pick up there seems little point in refusing the use of the vehicle. This is more so, because users could be demanding and the staff would be well advised not to get into conflict situations.
 - There is use of this vehicle to move disabled patients for elective consultation – for example a fracture patient in a plaster cast moving in for his monthly review by the

specialist. This is a typical non emergency patient transport need- which is essential, for which other than “Dial 108” there is no alternative arrangement.

- There is the risk of a moral hazard- of reduced trips per day, if payment is made on per day or per month per vehicle basis, and to maximise trips if payment is being made on a per trip basis. The call centre despatches the ambulance, but the algorithms and their despatch thresholds are flexible and could be re-set to increase despatches. There is evidence that in high use situations, especially where its payment at “whatever it costs” terms, or where there are minimum targets of trips to achieve, the use of the vehicle for non emergency patient transport- which is non-essential takes place and we do not know how to regulate this. The evidence is anecdotal, but reported frequently enough to act on it. There are however number of options being tried out in a few of the states which have adopted tendering routes and these are promising. We note that this implication of a management pressure to increase trips has been categorically and strongly denied by the management- and we would take that assertion on trust. Still a system so large and now so universal with so few a number of vendor agencies, needs an independent monitoring or audit of its use, or else it is vulnerable to attacks in media and by vested interests. Though it is good to have a formal advisory committee and a nodal officer in charge of monitoring, what one needs is a regular sample check by an external party.
- Governance especially as relates to financing remains a challenge. The EMRI was by written agreement a monopoly provider in the states where it was operational. In the nation as a whole there was in the year 2008, no other party which could bid for the services and indeed most states awarded contracts to EMRI without going through a public bid process. EMRI would also not enter bids on the grounds that it was not possible to quote or go by L1 criteria and technical merit could never be fully factored in.
- This situation has been changing- but slowly. One major driver of change is the courts. The first PIL on ERS was filed in August 2008 and ruled upon in December 2010. The court concluded that state governments were in a better position to take a call and the site of contestation should be high courts- and not straight to the Supreme Court. Then tendering started up in some of the states- but because pre-qualification rules and tender documents were weakly and variably constructed, so did contestation as well the phenomena of repeated re-tendering. Kerala tendered three or four times, Himachal thrice, Punjab and Bihar twice and so on.
- The history of legal contestation is also brisk. In Delhi a contract was awarded, but the party was adjudged as failing to deliver and the contract terminated- and it went into arbitration and perhaps the court. Himachal awarded the contracts by tender, the tendering party failed to qualify, at which point they re-tendered, but then finally awarded it to EMRI by nomination. This was unsuccessfully contested in the high court, and is now in contestation in the Supreme Court. Bihar first awarded a contract through tender for its main cities. Then expanded to whole state by tender and awarded it to one party. But this has been seriously contested. Uttar Pradesh awarded by tender to EMRI, but it has been contested in the courts by a Foreign Service provider who bid for the contract. Maharashtra has gone through the tendering process, but not

yet declared the results. There are reports, that because two of the main providers EMRI and ZHL are excluded at the technical stage itself, that contestation is more than likely. Notable exceptions are Rajasthan and Punjab, where the tendering was successful, and the winning party Ziqitza health care services is running the service. Jammu and Kashmir had tendered and recently awarded it to EMRI- while Odisha's tender was won by Ziqitza.

- The tendering process broadly specifies pre-qualification criteria, and then the number of ALS and BLS vehicles needed and the equipment needed, and the staffing required and then asks for the bids in terms of per day per ambulance costs as the final measure of L1. In some bids the procurement of the vehicle is separate, (eg Odisha, Rajasthan) and in others it is packaged into the costs- sometimes given a separate weightage - and sometimes not. Systems of judging and scoring merit are difficult to construct and when bidders are eliminated by scores lost on minor technical criteria, there is doubts raised and legal contestation. States have brought in technical consultants to help in the contract design- like the AIIMS hospital management department for the Maharashtra bid. But then other measures like ring fencing contract design advice from conflict of interest situations, and ways of preventing tender contracts which unduly and clearly favour one or other equipment or vehicle or service provider are slow to develop.
- One of the problems of technical and financing scoring is the considerable variation between states in key issues of “Dial 108” design. The main issues of contract design – in tendering, implementation and payment- are:
 - a. The numbers and density of ambulances sought or deployed. Also the numbers and proportions between ALS and BLS ambulances deployed and additional patient transport vehicles where needed, and the reserve vehicles needed.
 - b. The numbers and density of human resource that would be deployed per ambulance. Some states insist on two technicians on board, some on one. Number of reserve drivers and technicians is also an issue.
 - c. Skills of the technicians are also an issue. Duration of training for Emergency Technicians ranges from 7 days to 4 months. GVK-EMRI recommends a 6 week course based on a national multi-stakeholder workshop held in 2006.
 - d. The extent and quality of pre-hospital care that would be provided. This is reflected not only in training, but also telemedicine arrangements and the supply of medicines. Most states do not specify. Others like Rajasthan reimburse the operator for medicines and consumables.
 - e. Including or excluding inter-facility transfers or drop back home and other patients in the contract obligations. Patient transport as distinct from emergency response has not yet entered into the dialogue.
 - f. Monitoring measures. All state systems have a monthly report presented to some form of monitoring committee and a discussion with one nodal officer. Some have in addition electronic systems on all vehicles and a daily midnight report of number of calls received, and number of despatches/trips made and number of patients transported. But few if any

state has any independent sample based verification of the data submitted or would know how to independently assess claims of performance. Given the nature of tendering and contestation and changes in leadership, such measures are essential to defend the programme, even if largely the relationships are based on trust.

- g. Efficiency and Quality Maximisation: If a successful bidder has won on the basis of a quote of lowest per vehicle per month costs, then the less trips they make, and the shorter the distances they travel, the more likely they are to “break even.” If we note the public health issue we listed earlier with respect to difficult and remote areas, we can appreciate how contract design could be exacerbating this. We list below some of the “contract” measures tried to counter this:
- i. Penalties included in the contract: Rajasthan contract puts a penalty on performance below a minimum number of trips per day- fixed at 5 trips. There is deduction of 20% for each unit of lower trip average- thus 80% payment if there is 4 trips per day. Still others consider penalties for failing to reach on time- on an average. All penalties make a substantial difference to costs, without necessarily adding to quality and also leading to some problems of their own. Some contracts have stiff penalties – like Rs 10 lakh for a single confidentiality breach in one contract.
 - ii. Partnership and joint monitoring: Some states however, have decided that building a spirit of partnership and joint management, is a better way of ensuring transparency and improving efficiency- but there must be necessary skills and continuity in the government management side to do so. One cannot in the real world, hope to have three consecutive officers ever who would have the same attitude as regards the partnership. One would have to trust contractual measures. However, as the system learns, the contracts are clearly becoming more and more sophisticated on these issues.
 - iii. Payment For Excess Km travelled: Some states sign the contract and then agree to pay, over and above the contract amount, the POL costs beyond a certain kilometres level travelled. The rates are fixed so that there is no profit maximisation, but by defraying costs of travel for say, more than 30km, there is no perverse incentive to keep to short and easy calls only. This could be particularly valuable in difficult terrain and low vehicle density.
 - iv. Standard Operating Protocols: In Odisha what is proposed is a mechanism to jointly agree on detailed protocols for all types of situations- from receiving the call, to despatching the ambulance, to picking up or not the patient, to where to take them. These can then form the basis of monitoring and operation, with payments over and above contract amounts when there are calls which exceed them.
 - v. Quality standards on time- with variable input costs are also possible. Thus Odisha contract proposes to fix a standard of 15 minutes to reach –average- and agree to

provide more vehicles if in a place this cannot be met. Of course the costs would go much higher.

Each of these variations would lead to substantial changes in how the bidder quotes. For all these reasons and variations, the successful bid, could vary from about Rs 94,000 per vehicle to Rs 1.4 lakhs per vehicle per month. Since the variations in details and in promised quality and amounts of service are so high, one cannot form an understanding just on the absolute number quoted. But yet this variation is a good and a source of innovation if accompanied by cross- state learning and independent studies.

Despite these developments, and despite the entry of one more service provider as a credible competition to EMRI, there are not enough players to guard against monopoly, or to constantly improve the quality of services. Further the very process of tendering, with its lowest quote approach, could move against maximizing quality of care and wider range of services. Management by a cell of government officers or consultants in the state programme office is perhaps adequate for referral transport services, but managing a complex of ALS, BLS and patient transport vehicles is well beyond such ad hoc management arrangements. It needs a system of management where accurate data analysis must inform a continuous and responsive tweaking of the system- and that indeed is strength of the “Dial 108” model. It also needs systematic learning and transfer of technology from the best case benchmarks in the world. The question is how does one factor such considerations into a tendering document or contract? Would entry of foreign providers directly, or through partnership provide more skills and competition or should the government negotiate separate technology transfers brokered by development partners. As the number of providers grows, should we dis-allow those running hospital chains from also providing ambulance services in the same area- to prevent potential conflict of interest situations?

Another issue is whether in large states we should have only one provider or more than one- dividing the state into two to five regions depending on the size of the state. HSVS has district call centres. But there is concern that this would fragment ownership and accountability, decrease quality, increase more inefficiencies in inter-district transfers of calls and patients, and pose technical problems in establishing and managing so many call centres. So this is a case against a call centre in every district, there is still a strong case to invest in at least three or four centres instead of only one. Also important is for disaster situations and system crashes a back up located in two three places is suggested- rather than concentrate resources in just one area. Especially when police, fire and medical help are all routed through a single number, more than one node is required. The single main reason for more than one provider and call centre in a state is for a “managed competition” approach which requires a minimum number of providers.

There is also the issue of pre-ambulance care. Whosoever calls the ambulance, presumably a lay person can be guided telephonically for provision of first aid till the ambulance arrives. Also the nurse or community health worker attending to delivery should also be called on to provide first aid or stabilization care. Most nations have considerable investment in training on first aid and bystander responses. This has begun only in very few states, and in a very limited manner.

No Out of pocket spending by the beneficiaries is one of the major achievements of the Dial 108 and JE model. The HSVS model is free for pregnancies and newborns, and for all BPL, but it has user charges for non BPL other users- which has reduced its utilization for such purposes.

The “Dial 108” model seems to be more costly when compared to the other three models (see table no 17), but given the quality of care and services and the number of call attended the cost seems to be justified. Moreover the forecast of EMRI showing reduction of cost per trip to Rs 450 or the per vehicle per month cost to Rs 1 lakh or the Rs 12 per capita population costs makes it even more affordable. Even if its intensity of utilization doubled the costs would be contained at Rs. 20 per capita or about Rs. 2400 crores for the nation. If the model was intensified by assuming all three models running concurrently to gain synergy, the costs would still be “affordable”.

Quality of care in case of emergency transportation has three important aspects; response time, stabilization care and a network of hospitals where the patients can be taken for treatment. EMRI is not better on response time, but it does provide stabilization care in transit.

The outcomes of all three models are limited by the availability of hospitals which can provide emergency medical care as different from only provide retrieval and shifting of the patient. The JE has approached this problem best- but this approach is limited to care during child-birth. Expanding a similar approach to all emergencies including trauma care is an entirely different and much more difficult proposition. But still the principle is valid.

Table 17: Comparative Performances of 3 Models of ERS in India

	Ambulance / lakh population	Cases moved / vehicle/ day	Cost/vehicle/ mnth (lakhs)	Cost / patient transported (in RS)	Cost/ vehicle deployed/ year (in Lakhs)	Cost/ district (in Lakhs)	Cost per capita (in Rs)
EMERGENCY REPOSE SERVICE Andhra	0.89	3.59	1.05	565	12.59	529	14.36
PATIENT TRANSPORT SYSTEM- (Haryana)	1.32	2.85	0.31	562 (Avg)	3.68 (Avg)	82	6.79
LOCAL PT. TRANSPORT SUPPLEMENTATION- JE-ODISHA	0.82	1.73	0.15	391	1.74	28	2.00

*Costs calculated on the basis of study districts of respective states.

A Concluding Assessment of the HSVS Haryana

This model makes efficient utilization of all ambulances already in government system. The district level call centre lowers costs, and also makes navigation to site of pick up easier and allows for more informed choices of where to take the patient.

The main positive feature of this model is that it in addition to be efficient at shifting pregnant women to the facility it also allows for much higher use for inter-facility transfers and drop back homes. The system of monitoring and supervision is also very robust.

However the study finds the system under-utilized, from a return on investment view point, the system can potentially be strengthened and extended to other emergencies. At current design its absolute costs are low, but unit costs are high. Such an expansion of range of accidents it provides for along with wider publicity for the same would make it more cost-efficient. This is also the public health need. But then it would require more staff, more training and more organization. Even now due to weak management inputs the HSVS cannot be said to achieving quality standards or intensity of use. Weak management would also mean problems of renewal, bringing in new vehicles etc. The problem of a government alone system with all fixed payments is that there is no pressure to increase the work load, beyond what is mandatory and closely monitored. About 90% of the ambulances were operating on an inefficient scale. Even within the same districts costs per km were highly variable. There is no investment in advertising the services locally, especially for non pregnancy uses. If categories of emergencies like road traffic accidents encouraged-, then can reach higher efficiencies and affordability- but this must go along with building facilities which can take care of the cases once they reach.

In conclusion- HSVS can be seen as an efficient patient transport system making full use of existing assets and building on it. This could be the first stage, to be insisted upon as a minimum requirement everywhere, while we move towards an emergency response system linked to emergency care services.

[The Janani Express of Odisha](#)

Its greatest complement and achievement is as a local innovation and adaptation to get much higher effectiveness in providing transport to pregnant women in the most hostile of areas, without any additional budgetary request. Further, this great increase in effectiveness is achieved in arguably one of the nation's most difficult districts. Perhaps the complete lack of other transport alternatives also contributes to such an output.

The other strength of the model is how not only has it been integrated with a vision of facility development, but also that by doing so, it has avoided the trap of bypassing development of local facilities and centralizing the service delivery in the higher centres – as both the other systems are getting into.

Though potentially it can be expanded to a greater variety of emergencies, even as it stands today, with some more investment in trained manpower on the vehicle, it would not be as easy to improve the range of facility based care in parallel. Thus if the other emergencies like RTA and cardiac would have to be moved to the district hospital, then, this quality of vehicle and staffing is not going to be adequate- and the system would not be able to allow this.

In conclusion: However interesting and innovative the model, the time for this JE model as a standalone solution is over. However this model remains relevant as a patient transport system that would be needed to supplement an EMRI put in place, especially in all districts which have similar widely dispersed populations and in tribal contexts- with use for a much wider range of patient transport- and even provider transport- like an ANM to bring a woman to the institution, in case she delivers on the spot or on the way. Indeed, one could even work out tie-ups with vehicles in a level below this, even within villages at fixed rates.

SUMMING UP:

All the models can be seen not as alternatives to each other but as complementary. They could also be stages in the development of patient transport systems, growing into emergency response systems, or could all start at the same time. The Dial 108 provides the basic emergency response – scoop and run – services- and the government ambulances linked to the same call centre prioritize inter-facility transfers, non emergency pregnancy transport and drop back homes. The JE type tie-ups are added on where there is considerable dispersal of population and can be used for elective patient transport of sick patients when not being used in an emergency. This would be most relevant in hilly and tribal areas.

Depending on the context and availability of funds choices can be made on which system to start with it – but eventually all three types of services, unified by a common command structure would be needed for maximizing efficiency and outcomes.

THE WAY FORWARD:

11. Emergency Response systems have arrived- with surprising degree of suddenness and effectiveness!! They are well past the point of reversal. Even as central government phases back its support- states are ready to pick up the bill. But it has arrived from the emergency rescue and retrieval side and not from emergency medical care side. Further it has been driven forward by the compulsions of providing assured patient transport for pregnant women coming for delivery, which has different design requirements. The challenge is to convert the leanings from the multiple innovations and diverse experiences to date into a sound approach to the provision of all emergency response and medical care- which addresses all elements of the emergency care chain and of patient transport facilities- including the needs of pregnant women and emergency obstetric care but not being limited by it.
12. The single biggest weakness is to see ambulance services in isolation from facility based emergency care. Emergency response system must be seen as a chain- -immediate pre-hospital care, retrieval and transport, en route stabilisation care and emergency care at the facility. These should be part of an integrated district plan to develop a network of assured service delivery points for each type of emergency care: Obstetrics, trauma care, burns, poisoning, cardiovascular, other medical emergencies, surgical emergencies and ophthalmic emergencies.
13. The other big weakness is to see ambulance and patient transport services as a single type of care or provide for only one or other type of care. Instead it should be seen as consisting of at least three – if not four types of service. One is the advanced life support ambulance which can provide emergency cardiac care including ventricular defibrillation. This needs a very well trained technician and preferably, at this point of time legally mandatorily, telemedicine guidance from a physician or cardiologist. The other is the basic life support ambulance, which can manage splints and even blood transfusion if need be, plus active intravenous drugs and electrolytes. This is also the “scoop and run” function and sometimes even a BLS is not needed for this. The third is mere patient transport-

where no active stabilisation care is needed en route and by implication it is not an emergency- at least where there is no golden hour applicable. Deliveries could be part of patient transport or of part of BLS arrangements. And the fourth- which we don't use- is a motor cycle based advanced – pre-ambulance “treat and triage on the spot” person. By integrating these three models- the “Dial 108” model to emergency care, the JE and HSVS type for patient transport and inter-facility transfers, we could at very affordable costs get the advantages of all three types of patient care services. Thus the ALS should be despatched only where a higher level emergency is expected- and not used interchangeably with the other types of ambulances. Where we cannot have more than one type of ambulance stationed at a site, providing duplicate cover- an ALS should not be introduced.

14. In large states there should be more than one call centre, perhaps two to five, instead of only one per state. The call centre should link both government ambulances and EMRI ambulances and if needed local patient transport vehicles. The call centre would know the situation of each ambulance by both GPS and a simple time out and time on call from the vehicle. It would also know the exact location of assured services for every type of emergency. It would be thus able to choose which vehicle to send to pick up what type of patient and take them where- in a much more organised way. Each district and each ambulance and the call centre should be aware of which facility provides care in what emergency situations and be able to shift the patient there- providing stabilisation on the way- which could be on ambulance or at an en route facility.
15. In addition to the “Dial 108”, government ambulances and local partnerships all running as one coordinated system in a district, there could be one more level of voluntary vehicles available on call- one for each village. All of these could get mobilised together in a disaster situation. In other times, it would provide some duplication cover, in case the first vehicle is timed-out (engaged on another call). In many international systems, a second ambulance would be on wait, but this may be more affordable for us, especially if the main load is patient transport and not true emergency rescue.
16. Deputing and incentivising a trained ANM or staff nurse in the van, at least for pregnancy despatches and at least where travel times are high or labour is advanced, could take care of high numbers of on-the-way deliveries and deliveries taking place at the pickup point. This is most needed for tribal areas and dispersed populations where turnaround time is very high. Even incentivising the ASHA to accompany the van rather than leaving the driver and male paramedic alone at the point of emergency would be a step forward. Given the high absolute numbers of deliveries happening on the way or at the point of pick up, birth asphyxia management and immediate post natal care must be part of paramedic training must be made available in all the ambulances. (safe delivery kits are already available)
17. Properly tendered and organised and fine tuned, the net costs of the ERS in a district should not be higher than what is the current costs which we estimate at Rs 4.63 crores for a district of 20 lakhs population- if all three systems run concurrently. In fact it should be less. If the usage rises from current about one thirds of emergencies and patient transport needs and greater standards of

efficiency are imposed it could rise to Rs 12 crores per district- or about Rs. 7200 crores in all- to be shared between the centre and all the states. This is the outer limit, and in our view is affordable. At current utilisation rates the actual cost would only be about one thirds.

18. In terms of priority- every state could start immediately with assured patient transport systems linked to facility based emergency care- firstly for pregnancy and children below one, then expanding to a larger category of emergencies through an emergency response system and finally include patient transport for certain other categories of vulnerability as well. Local tie-ups can start up immediately in tribal and dispersed population areas as a supplement and may again be needed when an expanded role of patient transport for vulnerability is considered.
19. We suggest the state being divided into two to five regions depending on the size of the state with a separate tender for each circle. This will ensure greater number of providers and more space for innovation and improvements in quality of care and in efficiency. However we do go along with a non-government management agency holding a contract rather than running it as an internal department of health management - at least for the first five years. The importance is that though we may have a few dominant players, there should be a minimum of at least three to five credible agencies that would bid for the tender and have the capacity to innovate and to deliver. A relative monopoly is alright- an absolute one is not. Tendering properly and “managing competition” is the key. This is important for not only getting the best costs and service now, but also for sustained innovation and improvements. And the MOHFW must play a role in promoting cross learning across states, and development of model tender documents with different options.
20. Some broad guidelines on the tendering process are recommended. The vehicles and equipment purchased should be done so directly by the government, based on specifications decided by an expert committee and with the winning providers on the tender evaluation committee. The medicines and diagnostics and other supplies should be supplied by the government- based on a commonly agreed upon essential drug list. The actual service provider selection could be based on a per vehicle per month cost basis after excluding these two costs, with a detailed tender document specifying manpower and quality standards and a set of SOPs. Once agency is contracted, the rates can be revised based on modifications of SOP. Joint Monitoring protocols should be much more rigorously applied and no figures provided by the ambulance provider are taken without sample testing. The practice of paying for extra km beyond a threshold - at costs- should be encouraged especially in difficult terrain and for remote areas. Most important integration with supplementary patient transport arrangements using government vehicles and local tie ups is to be made mandatory and costs of such integration built in.
21. One interesting variation that could be tried is a reverse auction, where the sum of money to be awarded is fixed- say Rs 15 per capita. Also declared is what assets government is turning over. The competition is for higher technical merit and the range of services provided. The range of services could include not only stabilisation care and shifting of the patient and the call centre costs- mandatorily but also the first aid training and facility level stabilisation training it could offer within these financial resources.

22. All of these need good consultancy support- but those providing support should have no shares or stakes or conflict of interests with any of the providers, not even receiving sponsorship for academic conferences, much less individual sponsorships. Thus a national watch on such contracting becomes important. There should be a separate state or national level team that constantly oversees all the contracts in this area, and measures the level of performance. It should provide a six monthly update on the progress and achievements of emergency referral transport systems in the country. It has no powers of a statutory nature, but given the intensity of legal contestation, even a good information sheet and observatory with access to pertinent facts would provide enough moral persuasion for better standards of governance especially in procurement, payments and monitoring systems.
23. The centre should retain 50% of both CAPEX and OPEX costs at all times. This makes for more careful choice of ambulances instead of heading for excessive numbers of ALS, and it makes for joint efforts to cap moral hazards of over consumption or reduced efficiencies. The case for ALS under the current circumstances is far from clear, and states should be discouraged from going for it, until they are in a position to actually deploy ALS capacities- which would mean more than one ambulance for the same locale and emergency coronary care units of required dispersion and effectiveness.
24. States need to provide a legal framework needed for putting in place emergency medical care as a basic right. The act should also ensure private sector engagement, public sector prioritisation, human resource development, and the institutional reforms needed for achieving this goal.
25. There is considerable room for point of care innovations and with telemedicine, for better on the way stabilisation, and for better human resource development. More investment in creative management and research support is also needed. We note that the current process of limited competition has helped the process of innovation to bring down costs and improve on features and this must be retained. We note with appreciation that the current agencies have been keeping abreast of innovations and have developed international and national collaborations and in this environment any new vendors who is able to join in is also likely to do the same.
26. But in parallel to competition-driven innovation, there should be publicly financed learning from functional ERS across the world- from Scandinavian success stories to third world success stories – both for technological innovations in emergency care and for management and governance issues like contracting systems, outcome measurements, monitoring and support frameworks are also an urgent necessity. A systematic transfer of technology to Indian providers and Indian technical support teams from the best of these is also recommended.
27. We suggest a national workshop where we invite the major national ERS service providers, some good international agencies, and key decision makers from the states on this theme. This note and the Deloitte study may be provided as background paper and the different tender documents and the contracts signed by states may be provided to the participants. There would also be a standards and design draft document that could be placed for discussion. The workshop should help the MOHFW finalise its strategy for taking this initiative forward under the 12th Plan. The system should

then be decentralized to state and intra-state regional level models, and rolled out at a pace that recognizes the differing capacity to implement in different states and regions- but at the same time, all the models should conform to a consensus on design principles and standards of emergency care and patient transport that are arrived at jointly between centre and the states.

In conclusion:

Though initiated by a few states which made good use of the NRHM provided flexibilities for innovation, and driven forward in the 11th Plan period by the need to ensure universal access to institutional delivery and emergency obstetric care services, the system has gone far beyond that. Instead of almost inadvertently and reluctantly being dragged into the world of publicly financed emergency medical care, the MOHFW needs to proactively embrace it. The national commitments to provide emergency medical care to all made clear in both the public announcements of the prime minister, and the working group report on the 12th Plan, the legal mandate to ensure emergency medical care as flowing out of court rulings, the political commitment to raise public health funding to 2.5% of the GDP and achieve universal health care- all make it an opportune time to design a centre-state joint implementation framework, with costs shared between the two, for reaching this goal of universal access to emergency medical and trauma care.

Much water has flowed down the bridge, since the time when NHSRC last reviewed the progress of Emergency Response Systems. Costs have come down, the programme has expanded, the efficiency has increased, alternative models have provided new insights, the number of service providers has increased and the ability of facilities to respond to the emergencies being brought in has also increased. Perceptions have changed in both the state and the centre, to seeing such investment as both affordable and essential. State ownership over the scheme is also no longer a constraint. The challenge now is to ensure increased value for the money being spent through institutional and technological innovation and develop it as a pathway to achieving universal access to all emergency and trauma care services.

Annexure I: Summary of Key Features of Deloitte Study

Table A-I: Summary of Key Features Six ERS schemes in India

Summary Findings – Deloitte Study							
ASPECTS		ASSAM - EMRI	HARYANA - HSVS	MADHYA PRADESH - JEY	MADHYA PRADESH - EMRI	RAJASTHAN - EMRI	RAJASTHAN - ZHL
Operating Model		PPP between the GoA & EMRI	Government	Government	PPP between the GoMP & EMRI	PPP between the GoR and EMRI	PPP between the GoR & ZHL
Commencement Year		November 2008	November 2009	Dt Pilots ,2007, all dts : 2010-11	July 2009	September 2008	July 2010
		Operational for less than 3 years	Operational for less than 2 years	Operational for less than a year	Operational for less than 2 years	Currently not operational	Operational for more than a year
Geographic Coverage		Serves the entire state	Serves the entire state	Serves 44 districts of the state	6 districts; extended to two more districts now, planned extension to all DHQ towns soon	Serves the entire state	Serves the entire state
Scope of Services	Type of cases	Provides comprehensive services including medical, police and fire emergencies	Serves only medical cases	Serves pregnancy cases, has recently been extended to sick new born and malnourished children	Provides comprehensive services including medical, police and fire emergencies	Provides comprehensive services including medical, police and fire emergencies	Provides comprehensive services including medical, police and fire emergencies
	Type of services	Transportation and in-transit care for patients	Pure transportation service with only basic first aid on board	Pure transportation service with minimal in-transit care	Transportation and in-transit care for patients	Transportation and in-transit care for patients	Transportation and in-transit care for patients
	Health facility	Patients usually transported to nearest public health facility. However, where patient insists, can	Patients are transported only to public health facilities	Patients are transported only to public health facilities	Same as stated for Assam EMRI	Same as stated for Assam EMRI	Same as states for Assam EMRI

Summary Findings – Deloitte Study

ASPECTS		ASSAM - EMRI	HARYANA - HSVS	MADHYA PRADESH - JEY	MADHYA PRADESH - EMRI	RAJASTHAN - EMRI	RAJASTHAN - ZHL
		also be taken to a private facility.					
User Charges		Free for all categories of users	Free for pregnant women, BPL, newborn. All others@ Rs.7 per kilometre, also charged for return journey in drop home	Free for all categories of users	Free for all categories of users	Free for all categories of users	Free for all categories of patients
Management and Implementation Arrangements	Duration of contract-	valid for a period of ten years and can be extended by another ten years	NA	Duration of contract with vehicle service providers is two years	valid for a period of ten years and can be extended by another ten years	Valid for a period of five years but was terminated early	Valid for a period of three years and can be extended by another two years
	Management of operations	Entire operations are managed by EMRI	Managed by the State Health Department, thru Red Cross Society in some districts, and directly in the rest.	Call Centre is managed by the Government, ambulance operations are outsourced to private service providers	Entire operations are managed by EMRI	Entire operations are managed by EMRI	Entire operations are managed by ZHL
	Payment terms-	Payments are made by GoA to EMRI at actuals- “whatever it takes to provide quality services”	NA	Fixed fee is paid for 1200 kilometre run/ambulance (actual distance travelled varies from district to district). Additional kilometres are charged at the rate Rs. 5- Rs. 7/kilometre based on type of terrain	Payments are made by the Government to EMRI at actuals “whatever it takes”	Payments are made by GoR to EMRI at actuals “whatever it takes”	The state pays ZHL Rs. 94,899/month/ambulance for an average five trips/day. The payment is reduced proportionally if the number of trips is less than five. However there is no additional payment for doing more than five trips
Call Centre	Extent of	Call centre	Call centre	Call centre	Call centre	Call centre	Call centre

Summary Findings – Deloitte Study

ASPECTS		ASSAM - EMRI	HARYANA - HSVS	MADHYA PRADESH - JEY	MADHYA PRADESH - EMRI	RAJASTHAN - EMRI	RAJASTHAN - ZHL
Operations	centralisation-	operations are centralised and based out of Guwahati with 24x7 operations	operations are decentralized at the district level	operations are decentralized at the district level	operations are centralised and based out of Bhopal with 24x7 operations	operations are centralised and based out of Jaipur with 24x7 operations	operations are centralised and based out of Jaipur with 24x7 operations
	Calls handled by the Centre	<p>Average number of calls/day- 1500 relevant calls (~21.5% of the overall calls received)</p> <p>Average number of pregnancy case related calls/day- Around 35% of medical calls received Call data for sick new born cases is not maintained separately</p>	<p>Average number of calls/day- 767 calls per day across call centres (<i>only those calls are recorded for which an ambulance is dispatched and availed</i>)</p> <p>Average number of pregnancy case related calls/day- 35% Data for sick new borns is not monitored separately</p>	<p>Average number of calls/day- 700 calls per day across call centres (<i>only those calls are recorded for which an ambulance is dispatched and availed</i>)</p> <p>Average number of pregnancy case related calls/day- ~100% with negligible sick new born cases at the moment</p>	<p>Average number of calls/day- 371 relevant calls (~1.1% of the overall calls received)</p> <p>Call data for pregnant women and sick new born cases is not maintained separately</p>	<p>Average number of calls/day- 991 relevant calls (<i>only those calls were recorded for which an ambulance is dispatched and availed</i>)</p> <p>Average number of pregnancy case related calls/day- not captured</p>	<p>Average number of calls/day- 787 (<i>only those calls are recorded for which an ambulance is dispatched and availed</i>)</p> <p>Call data for sick new born cases is not monitored</p>
		24*7 doctor available at call centre to provide medical guidance to EM paramedics for care	Nil	Nil	Same as stated for Assam EMRI	No doctor- only technician on board	

Summary Findings – Deloitte Study

ASPECTS		ASSAM - EMRI	HARYANA - HSVS	MADHYA PRADESH - JEY	MADHYA PRADESH - EMRI	RAJASTHAN - EMRI	RAJASTHAN - ZHL
		-in transit					
Ambulance Operations	Total number of ambulances across the state	280	338	614	89	164	265
	Population based deployment norms	one ambulance / lakh population (stipulated in the contract)	one ambulance/ 75000 population	one ambulance/ 79000 population	one /1.35 lakh population ; norm stipulated in contract.	one /4.1 lakh population; norm stipulated in contract)	one ambulance/2.6 lakh population
	Area based deployment norms-	one ambulance /280 square kilometre	one ambulance/ 131 square kilometre	one ambulance/ 502 square kilometre	one ambulance /371 square kilometre	one ambulance/ 2087 square kilometre	one ambulance/1292 square kilometre
	Type of ambulance-	Advanced Life Saving (ALS) ambulances with a driver and trained EMT on board	Basic Life Saving Ambulances	Basic vehicles such as Omnis and Boleros	Basic Life Saving ambulances	Basic Life Saving ambulances	Basic Life Saving ambulances
	In-transit care-	The presence of paramedical staff in the vehicle as well as a doctor at the call centre makes it possible to provide in-transit care	Not provided since paramedical staff are not present in the ambulance	Not provided since paramedical staff are not present in the vehicle	The presence of paramedical staff in the vehicle as well as a doctor at the call centre makes it possible to provide in-transit care	The presence of paramedical staff in the made it possible to provide in-transit care	The presence of paramedical staff and helper in the vehicle makes it possible to provide in-transit care
	Dispatches for pregnancy cases-	34% of the dispatches availed			32% of the dispatches availed	26% of the dispatches availed	19% of the dispatches availed
	Operational Indicators						
Average number of trips/ambulance/day	3.2 ~ 31 kilometres	2.3	1.8	5.1 ~ 28 kilometres	3.1 ~ 16 kilometres	3.9 ~ 34 kilometres**	
Average distance		Covered	Covered			~ 40 minutes	

Summary Findings – Deloitte Study							
ASPECTS		ASSAM - EMRI	HARYANA - HSVS	MADHYA PRADESH - JEY	MADHYA PRADESH - EMRI	RAJASTHAN - EMRI	RAJASTHAN - ZHL
	travelled/trip	42 minutes	within one hour	within two hours	51 minutes	Not captured	
	Average time taken/trip						
Financial Indicators*	Operating cost/trip	Rs. 762	Rs. 358	Rs. 524	Rs. 670	Rs 357	Rs. 555
		Rs. 1105	Rs. 506	Rs. 530	Rs. 825	Rs 540	Rs. 843
	Total cost/trip including capital cost						
		Rs. 25			Rs. 23	Rs 22	Rs. 16**
	Operating cost/kilometre -	Rs. 36			Rs. 28	Rs 34	Rs. 25
	Total cost/kilometre -						

Source: "Assessment of Referral Transport Systems", Deloitte Touché Tohmatsu India Private Limited (Deloitte) and Ministry of Health and Family Welfare, Government of India; January 2012.

Annexure II: Comments from Mr. Subodh Satyawadi, CEO- GVK- EMRI

(Extracts- these are not the full comments- but some interesting responses which we thought were useful)

1. IN response to the NHSRC estimation on costs we make the following submission:

- a. The current Cost per vehicle deployed in Andhra Pradesh is only Rs 95000/- per vehicle per month. This it clearly indicates that the projected cost was wrong and GVK EMRI is the most cost effective Emergency Service Provider.
- b. It would be note worthy that the report itself reveals that a) GVK EMRI provides for pre-hospital care, not just patient transport, which means a trained and supported emergency paramedic on the vehicle b) that EMRI pays it staff better/more fairly and has three drivers per ambulance c) that EMRI has invested in management structures such that there could be renewal of investment and development of the model.
- c. With Current Cost per vehicle deployed is only Rs 95000/- per vehicle per month and with the features like pre-hospital care, not just patient transport, which means a) trained and supported emergency paramedic on the vehicle b) GVK EMRI pays it staff better/more fairly and has three drivers per ambulance c) GVK EMRI has invested in management structures such that there could be renewal of investment and development of the model. All these prove that of all models taken in the study no doubt GVK EMRI is quite affordable with high Quality standards.
- d. It is thus evident that GVK EMRI emergency response services including advanced technology and evidence based pre-hospital care by trained personnel (training EMT providing life support pre-hospital care for all emergencies including EmOC; online medical direction by a qualified MBBS doctors in critical cases, inter-facility transfer process; medical, police and fire emergencies integration, ability to connect patient/ EMT in ambulance, ERCP/ call agents in ERC/ Doctors in emergency rooms; ability to respond in case of MCI and Disasters) costs same though not less when compared to other providers of patient transport systems is a boon to the country,

2. In response to observations on robust monitoring systems in Haryana, but lack of mention of similar systems in the dial 108 case study:

- a) GVK EMRI are the pioneers in INDIA in utilizing the latest technology in Emergency transport system. AVLTL – Automatic Vehicle Location and Tracking is already successfully implemented in GVK EMRI.
- b) As per the MOU with the Government of Andhra Pradesh under CAPEX AVLTL - Automatic Vehicle Location and Tracking will be mounted on all the ambulances operating in Andhra Pradesh for real time monitoring. This project is already in pipeline.
- c) GPS used by Haryana system is confined only to vehicle tracking but AVLTL - Automatic Vehicle Location and Tracking used in GVK EMRI has the following advanced features:
 - **Automation** - Scheduled service alert, Minor repair alerts, Network disconnection alerts, Authorized alert, Equipment information, License of Pilot linked to ignition
 - **Customer Confidence** - Real time monitoring of the Vehicle, Displays the shortest route, Speed alert and Oxygen level sensor

- **Cost Saving** - Automation of Log books, PCR inputs & Stock reports Savings possible on stationary, courier and communication costs , Biometric attendance, Real time Information and Communication
- **Quality Improvement** - Single point of accountability, no multiple hand offs

3. In response to observation in NHSRC report on “This is not an emergency response system that is developing, but a stand-alone emergency ambulance services. There is no linkage to developing emergency medical services at the point of disembarkation. There is not even coordination between the ambulance service provider and the emergency medical service providers to take the patient to the nearest site where the specific emergency can be managed best- merely taking them to any hospital with an MOU which is nearest- rescues the patient, but does not necessarily save them.”

GVK EMRI strongly differs with the presumption of the above report.

- GVK EMRI has its own Referral Matrix to coordinate between the ambulances and the hospitals, to take the patient to the nearest site where the specific emergency can be managed.
- Victim arrival Intimation to the hospital authorities is by the Emergency Medical technician in ambulance enroute itself is a part of pre defined Process. Further in case of mass casualties, Victim arrival Intimation is done by the Emergency response Centre itself. However, for effective implementation proper resource setting at receiving hospital is necessary.
- Further Emergency Response Canter Physician (ERCP) guides the Ambulance to admit the patient in the right hospital.
- Government of Andhra Pradesh is working on facilitating Pre-Arrival Information from the ambulances to the receiving hospitals listed by providing emergency contact numbers of receiving hospitals district wise to make it more effective.
- GVK as a promoter so far funded more than Rs. 100 Crores towards top management salaries, program management, developing and refining processes, policies and protocols, Training and Research Department, Stanford technical collaboration. Hence, no investment referred in the report needs to be modified.

4. In response to observations that there is considerable room for innovation and the systems must allow for further innovations - note on innovations and the GVK EMRI model- note from CEO, GVK-EMRI

GVK EMRI stance of Emergency Managements and Research has proven its efficiency in 11 states of India in the arena of Care Innovations on par with global standards and is continuously exploring for further enhancements in EMS. GVK EMRI is already collaborating with Stanford University, USA, Carnegie Mellon University ,USA, GEOMED Research, Singapore Health Services, American Academy for Emergency Medicine in India, American Assoc of Physicians Of Indian Origin (AAPI), Public Health Foundation of India, Shock Trauma Center ,USA for Transfer of knowledge Technology know- How, Best practices, Research & Training.

- Telemedicine – Emergency Medical Technician Advises the caller on Pre Arrival Instructions,

- b) Continuous Hand Holding by Emergency Medical Technician till ambulance reaches the scene, Emergency response Centre Physician Advise to the Emergency Medical Technician in en-route to the hospital, Victim Pre Arrival Information to the Hospital authorities in en-route, World class pre hospital Care inside the Hospital
- c) Continuous Skill set up-gradation - BLS, ITLS, BLSO, and Refresher Programs for the Emergency Medical Technicians for better human resource development.
- d) Technology up gradations and Innovations -To ensure consistent Quality of Service to the Victims Customer in Emergency. Refresher training programs focus on medical equipment maintenance and repair, soft skills, automated external defibrillator, AVLT, Protocols of emergency pre hospital care at EMT level and ERCP advice using communication technology.
- e) Various Applications – Communication Officer Application (COA), Dispatch Officer Application (DOA), Patient Care Record application (PCR), Hospital Information System (HIS), Fleet Management Software (FMS) and related databases aimed at automating most of the critical processes of operations.
- f) SMS Technologies – Advanced SMS Server helps in quickly sending the information to EMTs from the Dispatch Officer Screen, Fleet management, Feedback mechanism.
- g) World class IT Infrastructure –The entire IT Infrastructure is designed to meet the world standards such as ISO 27001 etc. Redundancy is ensured at all levels of Systems and Network.
- h) High Availability – All the applications & Infrastructure are designed such that the availability is maintained at 99.9%.24 X 7 Technology Support – Technology team supports operations team on 24 X 7 bases to ensure the high-availability of Network & Systems.

5. The district level call center lower costs and also makes navigation to site of pick up easier and allows for more informed choices of where to take the patient. (This was with reference to the Haryana model- but consideration for upgrading it- we have subsequently changed recommendation from district to regional).

“GVK EMRI strongly disagrees with the above statement“

- a) The district level calls centre increases the costs as infrastructure needs to be setup in all the districts – Hardware Costs is increased multi fold as similar redundancies need to be built for each of the setups for such decentralized Emergency Response Centres; Feasibility of deploying best technological solutions in State-wide centre as the costs become prohibitive if it is at each district without any real benefit. Therefore, District level Emergency Centres remain few telephone operator centres without leveraging technology.
- b) Technically district level call centre leads to call congestion from the service providers which defeat the basic purpose of Responding to the Emergency within the shortest time – Call

Congestion is usually due to the infrastructure from the Telecom Service Providers as they may not have the required bandwidth to sustain/ support the flow within the district level;

- c) Border area villages/patients suffer a lot because the telecom tower in the border areas pushes the calls on either side of the districts – This shall add to the frustration and delays in providing the services as jurisdiction issues (especially in case of medico legal cases - ~30% of the calls received) may be faced by the Medical, Police and Fire service providers leading to higher number of inter district call transfers leading to compromising the life of a beneficiaries;
- d) Call Routing Issues at the Telecom Access Provider Level – technically may pose a challenge in transferring calls from telephony as multi-fold steps would be required to be effected for each of the districts leading to cost implication for each of the Telecom Access Providers which they may not have agreed upon;
- e) Referral transport will be confined to within the district, which poses a challenge in serving the Emergency – Complications Inter District Transfer to an Appropriate Medical Facility would call for unnecessary ambulance to ambulance transfers leading to ownership issues while providing pre-hospital care;
- f) Cost of Operation is escalated as overheads costs, including and not limited to manpower cost/ support staff requirement is increased multi fold; Economies of scale principle is squarely defeated;
- g) Single Point of Ownership/ Accountability principle is compromised/ defeated leading to multichannel disputes amongst district level service providers/ authorities – risking the life of a beneficiary;
- h) Standard of Quality is compromised as setting up of district level centres leads to experimentation while handling Emergency situations – Quality Monitoring and Evaluation becomes a daunting task;
- i) A Centralized Emergency Response Center & Services has the potential to leverage emergency management for common disaster situations e.g., earthquakes, floods, Tsunami, heavy rains, cyclones and major fires – while a decentralized workflow would leave the district authorities with additional/ redundant steps to be initiated leading to more loss of life which can be easily avoided with a Centralized Workflow/ Set up;

Referral transport will be confined to within the district, which poses a challenge in serving the Emergency. **IS and GPS Software** – Further GVK EMRI is using this application which enables the Emergency Dispatch Officer to access the GIS Vector data (maps) provided by Government agencies and identify the incident location, finding the nearest ambulance and assigning the available ambulance.

- j) There would be a need to keep Physicians 24X7 for medical directions at all the district levels which would make these scarce resources wasteful, costly and difficult to find.”

6. We suggest the state being divided into two to five regions depending on the size of the state with a separate tender for each circle.

Decentralization will lead to several disadvantages like high costs as entire infrastructure needs to be setup in all the districts, Technical issues, Time consuming, lack of proper coordination among district authorities and/ or multiple agencies, inability to respond/ delayed response to MCIs/ disasters, inability to inter-district redeployment (short term or long term) based on need/ usage, lack of centralized monitoring & accountability and ultimately failure of the model.

7. In response to comment on lack of Inter-facility transfer, patient give limited choice of facility to go to. But the facility as to be within the zone

We note the concerns expressed by the NHSRC but believe they are misplaced. In our view, Patient have unlimited choice of Inter Facility Transfer. So far in Andhra Pradesh 27,717 has been transported under referral transport.

- a) Further as per MOU 3.1.6. Government of Andhra Pradesh has to provide the list of hospitals district wise for Inter Facility Transfer (IFT) by GVK EMRI Ambulances for higher level of care with proper referral slip from the lower level hospital (referral criteria/Transit care instruction etc.). The inter facility transfer shall be to a higher Government Hospital.
- b) As per MOU 3.1.7. Government of Andhra Pradesh has to facilitate Pre-Arrival Information from the ambulances to the receiving hospitals listed by providing emergency contact numbers of receiving hospitals district wise.

IFT matrix at GVK EMRI

IFT	PHC / Small Private Clinic	CHC	Area Hospital	District Hospital	Govt.Hospital with Tertiary Care	Private Hospital with Tertiary Care
PHC / Small Private Clinic	No	Yes	Yes	Yes	Yes	Yes
CHC	No	No	Yes	Yes	Yes	Yes
Area Hospital	No	No	No	Yes	Yes	Yes
District Hospital	No	No	No	No	No **	No **
Govt.Hospital with Tertiary Care	No	No	No	No	No	No
Private Hospital with Tertiary Care	No	No	No	No	No	No

Annexure III: Comments from Ms Shweta Mangal - CEO Ziqitza Health Services Ltd.

(Extracts-these are not the full comments- but some interesting responses which we thought were useful)

- 1) The no of Ambulances under ZHL with various states are as follows, please make the correction appropriately
 - Rajasthan: 464
 - Punjab : 240
 - Bihar: 47
 - Kerala: 37
 - Odhisa : phase 1 will be 280 Ambulances
 - J&K with EMRI in the first phase will be 50 Ambulances
- 2) In Bihar it is for 504 Ambulances, you may mention that it has been awarded to Jain Video on Wheels and in Maharashtra (937 Ambulances) they will to give to BVG group on a single bid
- 3) On page no 14 the last line should read as Bihar has 47 Ambulances operational across 38 districts under 108 managed by ZHL
- 4) On page no 37 the following are my observations
 - a. In Odhisa and Rajasthan, the training modules are given and it is left to the operator to train staff on all the modules irrespective of the time taken. The training time is not specified in the contract.
 - b. Rajasthan does not provide free medicines. The system is to reimburse the operator for medicines and consumables.
 - c. In Punjab, ZHL provides detailed monthly reports every month which are the basis of discussions with Punjab Health Society.
- 5) ZHL has not signed the contract in Odisha, but the SOP is ready so that there are no disputes post signing. We expect it to be signed shortly.

Overall as mentioned earlier the paper is very detailed and I appreciate the efforts by the team. Do let me know if our team could be of any help.

Annexure IV: Comments from MO Referral Transport – NRHM, Haryana

(Extracts-these are not the full comments- but some interesting responses which we thought were useful)

The cost per patient transported is only Rs.321/- in Haryana State and if revenue generated is also deducted than cost comes out to only Rs. 303/-per patient transported. The same may be corrected in the write up and if required the details can be provided. This includes all the types of cost including control room expenditure.

The cost per patient transported by ambulance of EMRI is questionable. As per the data on page no. 42, per month cost of ambulance is Rs.1.05 lakh and 3.59 patients are transported per day per vehicle. This comes out to 111 patients transported per month. If we divide 1.05 lakh with 111, it comes out to Rs. 943/- per patient transported. More clarification required as to how the cost comes out to Rs 575/-. Also does it include call centre costs etc? In terms of sustainability of the system, the overall cost is more important as compared to per call cost, as there is probability that to reduce per call cost the no. of calls can be increased by transporting non-emergency cases.

District or regional level call centre is a good approach which also leaves scope for customization because of geographical and demographical variations in the different parts within a State (all areas within the state are not same)

Technical Consultants should be identified at national level for providing support to States particularly in improving communications. Separate Department of ERS should be formed by the States within the Health department for providing comprehensive emergency response which includes not only ambulances but also emergency department of hospitals.

The fleet should consist of at least one ALS per district and 10 BLS and 6 patient transport vehicles (and motorcycle paramedics in urban area) for medium sized district with population of 17 lakhs. Paramedics should be only positioned on ALS and BLS ambulances. The system should not be necessarily free. Those transported to private health facility can be charged while those coming to public health facility should be made free. The fixing of distance travelled by ambulance or creating a zone for ambulance is not practical as many a times the appropriate health facility may not be available in that particular zone.

Inter-facility transfer of patient within a district or to a nearest tertiary centre does not increase the cost much but provides necessary ambulance services to the patient in dire emergency being referred to higher centres. What it means is that the referred patients are in more emergency or critical situation than patients brought from home on site and any delay in transportation can be detrimental to the outcome. Single toll free number or two toll-free numbers can be earmarked for emergency medical services.



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